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ABSTRACT

A group of 27 library administrators and library computer systems experts met to share their experiences and insights with regard to online catalogs, to review survey results from The Council on Library Resources (CLR) 1982 Online Catalog Study, to review draft documents on the costs and features of online catalogs, and to discuss and recommend actions on matters required to advance the effective development and use of online catalogs. Included in the conference report are: (1) introductory material; (2) background information on the CLR study, which found that online catalogs provide better access to library materials than card catalogs, particularly for subject searching; (3) a summary of the meeting; (4) a description of working group conclusions on areas related to the cost, ideal features, implementation, and problems of online catalogs; (5) the consensus of the conference; (6) a description of concluding comments; (7) a series of recommendations to library administrators, library systems designers, and the Council; and (8) a list of five references. Appendices contain a list of participants; the meeting agenda; and summaries of reports funded by the CLR Online Catalog Study, including the David Bishop, the Research Libraries Group (RLG), the J. Matthews, the Library of Congress (LC), the OCLC, and the University of California Reports. (ESR)

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ONLINE CATALOGS:

REQUIREMENTS, CHARACTERISTICS AND COSTS

Report of a conference sponsored by
The Council on Library Resources

at the

Aspen Institute, Wye Plantation
Queenstown, Maryland

December 14-16, 1982

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March 1983

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CONTENTS

	PAGE
PREFACE	v
I. INTRODUCTION	1
II. BACKGROUND	7
III. SUMMARY OF THE MEETING	17
IV. WORKING GROUP CONCLUSIONS	27
V. CONSENSUS OF THE CONFERENCE	43
VI. CONCLUDING COMMENTS	47
VII. RECOMMENDATIONS	51
VIII. REFERENCES	55
APPENDIX A: LIST OF PARTICIPANTS	59
APPENDIX B: AGENDA	61
APPENDIX C: THE DAVID BISHOP REPORT	63
APPENDIX D: SUMMARY OF THE RESEARCH LIBRARIES GROUP REPORT	73
APPENDIX E: SUMMARY OF THE J. MATTHEWS REPORT	75
APPENDIX F: SUMMARY OF THE LIBRARY OF CONGRESS REPORT	81
APPENDIX G: SUMMARY OF VOLUME 1 OF THE OCLC REPORT	83
APPENDIX H: SUMMARY OF VOLUME 2 OF THE OCLC REPORT	91
APPENDIX I: SUMMARY OF VOLUME 3 OF THE OCLC REPORT	113
APPENDIX J: SUMMARY OF PART 2 OF THE UNIVERSITY OF CALIFORNIA REPORT	125
APPENDIX K: SUMMARY OF THE UNIVERSITY OF CALIFORNIA REPORT ON MELVYL USE	129

PREFACE

1982 was the year of the online catalog. The roots of this new library component rest in an earlier time and ultimate refinement is yet to come, but when measured in terms of effort, expenditures, interest and expectations, a critical mass was reached in 1982 and there is now no turning back.

If technology is at the core of the information revolution, it is also a powerful stimulant for communication among all who are concerned with and responsible for bibliographic services. The discussions reported in these pages simply add to the evidence on both counts. They also reflect the fact that online catalog development has been a responsible performance by the library profession as a whole. There is good cause for pride in what has been accomplished so far.

In this specific case, senior library administrative officers sat down with system designers to talk about the next stages of online catalog development. By the fact of participation and by the substance of the sessions, it is evident that there is a shared objective to move ahead in an intellectually responsible and economically realistic way. The needs of users for uncomplicated and consistent approaches to bibliographic resources, the concerns of administrators for operating performance and acceptable costs, and the professional obligations of systems specialists to concentrate on meeting user and management expectations all come together.

On behalf of library users, CLR acknowledges gratefully much help from busy people, especially those identified in the report who prepared papers or assumed leadership responsibilities. This is another step along the road that leads to the library of the future, and it is a big one.

Warren J. Haas
March 1983

I. INTRODUCTION

The development of effective online catalogs has become a major interest of the library community as a result of the continually decreasing cost of computer hardware, the growing body of machine-readable catalog records, the increasing difficulty and cost of maintaining present card catalogs (particularly after the adoption of new cataloging standards), the growing dissatisfaction with book and microform catalogs, the increasing use by libraries and library users of commercial information retrieval services, and the increasing recognition of user needs for improved finding tools in the library. This set of forces has led to a surge of activity in the development of online catalogs (OLCs). This significant increase in new systems prompted the Council on Library Resources to fund a major survey of the users and non-users of online catalogs in 29 libraries having such systems and also to support several analyses of the resulting data. A full description of the study plan appears in Ferguson, et al. (reference 4). In addition, there has been concern about the costs of such online catalogs and how such costs relate to the capabilities provided by the system; in the fall of 1982, the Council funded the preparation of a draft document on the costs and features of online catalogs.

On December 14-16, 1982, the Council on Library Resources convened a group of 27 library administrators and library computer systems experts to discuss Online Catalogs - Requirements, Characteristics and Costs. The

conference was held at the Aspen Institute, Wye Plantation, Queenstown, Maryland. Specifically, the conference was convened to bring together library administrators and system designers to share their experiences and insights with regard to online catalogs, to review some of the survey results from the CLR Online Catalog Study, to review the draft document on the costs and features of online catalogs, and to discuss and recommend actions on matters required to advance the effective development and use of online catalogs.

This report is intended to provide a sense of that conference, identify the important issues on which there was consensus, and summarize those issues where there were differences of opinion among the participants. In addition, it attempts to identify those areas in which the Council and others can contribute to the resolution of issues and to the effective development and rational adoption of online catalogs. This report does not try to provide a record of the individual contributions of the conferees or attribute specific ideas to specific individuals.

The conferees included administrators of research libraries both with and without online catalogs; those from libraries without an online catalog were actively engaged in investigating the implementation of such a system. Online catalog system designers of many of the best known online catalogs also participated. The major catalog systems represented included the Ohio State University system, the Mankato State University system, the Northwestern University system, the GEAC system, the Dartmouth system, the Washington Library Network, the Washington University Medical Library system, the Research Libraries Information Network (RLIN), and the MELVYL system of the University of California. Finally, the group included some individuals who

were recognized as experts in library automation or online catalogs but who fit neither of the above categories. APPENDIX A lists the participants.

Three major papers were distributed to the conference participants. The first two were analyses of questionnaire data collected in the survey of online catalog users/non-users; the third was the study of online catalog costs. Specifically, these were:

1. USERS LOOK AT ONLINE CATALOGS: RESULTS OF A NATIONAL SURVEY OF USERS AND NON-USERS OF ONLINE PUBLIC ACCESS CATALOGS. Final Report to the Council on Library Resources. University of California Systemwide Administration. Division of Library Automation and Library Research and Analysis Group. Berkeley, CA. 94720. November 16, 1982. 153 pp. plus appendices. (Reference 1. Has been submitted to ERIC.)

2. PUBLIC ONLINE CATALOGS AND RESEARCH LIBRARIES. Final Report to the Council on Library Resources. The Research Libraries Group, Inc. Stanford, CA. 94305. September, 1982. 75 pp. plus appendices. (Reference 2. Has been submitted to ERIC.)

3. COSTS AND FEATURES OF ONLINE CATALOGS: THE STATE OF THE ART. A draft report prepared for the Council on Library Resources. University of California Systemwide Administration. Library Research and Analysis Group and Division of Library Automation (with the assistance of Joseph R. Matthews). Berkeley, CA. 94720. November 16, 1982. 54 pp. (Reference 3. The final edition of this report will be available from CLR in July or August 1983.)

Throughout this report the above documents will be referred to as the Final Report, the RLG Report, and the Cost/Features Document, respectively.

The meeting followed this sequence:

1. A presentation by C. Lee Jones on the background and purpose of the conference;

2. A presentation by Gary Lawrence and Joseph Matthews on the Final Report and an oral report from David Bishop on results of the survey as seen by the administrator of a research library;

3. A report by Gary Lawrence on the Cost/Features Document;

4. A series of small group discussions of significant issues with regard to the costs, features, and implementation of online catalogs;

5. Reports to the entire conference of the results of the small group discussions; and

6. A general discussion of the issues arising in prior discussion and in the small group reports.

APPENDIX B is the agenda for the meeting.

There were six major issues that the conferees were asked to address on the basis of their experience and the results presented from the user survey; these six issues were:

1. Comments or recommendations on the Cost/Features Document.

2. Is it possible at this time to describe the characteristics of an "ideal" online catalog system for a research library? If so, what characteristics might be included?

3. Is it time for standards or guidelines for online catalogs in research libraries? If so, what standards or guidelines are needed?

4. What additional research is required to be able to do either of the above if insufficient information is now available?

5. Are there generalizable strategies for the implementation of online catalog systems in research libraries, and, if so, how can they be described?

6. What other problems related to online catalogs in research libraries require attention?

Before actually describing the results of the meeting, it is important to understand the results of the survey of online catalog use and the relationship of the results to prior catalog studies. The next section, BACKGROUND, attempts to summarize the use information from the point of view of what users did online as opposed to what they normally do in a card catalog.

II. BACKGROUND

In early 1981, the Council on Library Resources funded five organizations to conduct a coordinated study of user responses to public online catalogs. The principals in the consortium were J. Matthews & Associates, Inc., the Library of Congress, the Online Computer Library Center, Inc. (OCLC), the Research Libraries Group, Inc. (RLG), and the University of California. The survey questionnaires were pilot-tested in late 1981, and the consortium was ready for the main survey by early 1982.

Between March and May of 1982, self-administered questionnaires were completed by 8,094 users and 3,981 non-users in 29 participating libraries, representing 15 different online catalog systems.

The objectives of the national survey were:

1. To produce data and interpretations that will enable designers of public online catalogs to improve system interface features, including command language, displays, search methods, and other matters related to online catalog hardware and software.

2. To produce data and interpretations that will enable libraries to improve the implementation and support services (the organization interface) for public online catalogs.

3. To collect additional data that will enable libraries to remove barriers to the use of online catalogs and to extend service to potential users.

The most important findings of the survey of users of online catalogs were that: (1) 75% of users preferred the online catalog to the card catalog, and (2) the majority of searches were for materials on a subject. (Even non-users of the online catalog preferred it to the card catalog according to the survey.)

The study resulted in the collection of one of the largest bodies of information on users and non-users of any type of catalog that has ever been collected. The number of responses to the study questionnaire were summarized in Table 3 of the Final Report, which, with minor editing, is presented here as Table 1:

TABLE 1

FINAL QUESTIONNAIRE RETURNS

LIBRARY SYSTEM	USERS	NON-USERS
UNIVERSITY OF AKRON, OHIO	132	100
OHIO UNIVERSITY, ATHENS, OHIO	51	106
STEVEN F. AUSTIN UNIV, TEXAS	111	160
CLAREMONT COLLEGES	49	54
DALLAS PUBLIC	1081	299
DARTMOUTH COLLEGE	41	232
UNIV OF CALIFORNIA (9 campuses)	1259	0
EVANSTON PUBLIC, ILLINOIS	252	254
IOWA CITY PUBLIC	410	144
LIBRARY OF CONGRESS	525	298
MANKATO STATE UNIV, MINN.	281	240
MISSION COMM. COLLEGE, CALIF.	17	47
NORTHWESTERN UNIV	616	276
OHIO STATE UNIV	1247	282
OHIO STATE LIBRARY	5	86
PIKES PEAK REG. LIB., COLORADO	304	379
STANFORD UNIV	95	342
SYRACUSE UNIV	1339	294
UNIV OF TEXAS, AUSTIN	104	103
UNIV OF TEXAS, DALLAS	37	104
WEST VALLEY COMM. COLL., CALIF.	138	181
TOTALS	8094	3981

While the study covered 29 participating institutions, it should be noted that the responses to the questionnaire from four library systems (Dallas Public, the University of California (nine campuses: Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, Santa Cruz), Ohio State University, and Syracuse University) account for 60% of the results and the addition of two more (The Library of Congress and Northwestern University) raises the total to 75%. Thus, the study is heavily weighted to a smaller number of systems than the number of participants would imply. However, the total number of responses is such that the sample is large and useful.

What did these catalog users search for? Table 30 of the Final Report summarized the information needs of respondents as follows:

TABLE 2

TYPES OF SEARCHES CONDUCTED ON ONLINE CATALOGS

TYPE OF SEARCH	PERCENT
SUBJECT	34.1
AUTHOR-TITLE	17.5
AUTHOR	13.8
TITLE	12.3
AUTHOR-TITLE-SUBJECT	10.1
AUTHOR-SUBJECT	6.5
TITLE-SUBJECT	5.8

In his presentation at the conference (see chapter 3 and APPENDIX C), David Bishop, Director of the University of Georgia Libraries, summarized the results for the larger research libraries along the same lines as follows:

TABLE 3

WHAT USERS WERE TRYING TO FIND

LIBRARY/TYPE OF LIBRARY	SPECIFIC BOOK	BOOK ON TOPIC	BOOKS BY AUTHOR
PUBLIC LIBRARIES	49.4%	53.9%	23.5%
ARL LIBRARIES	52.3	51.0	24.5
MELVYL (U OF CAL)	36.4	59.5	24.6
SYRACUSE UNIVERSITY	55.0	53.5	24.8
OHIO STATE UNIVERSITY	57.2	47.7	22.6

(Percentages add to over 100% because users could select more than one answer.)

The data indicate users of the online catalog are searching for books on a subject somewhat more than half the time they use the catalog. The survey results also indicate that the need for topical access diminishes with increasing academic status of the users. Undergraduates are predominantly interested in subject access; graduate students are predominantly interested in specific books; and faculty are almost always looking for a specific book. The reasons for this transition from subject access to known-item access are unclear. It may be a reflection of the more focused interest of the academically advanced; it may be the result of the lack of appropriate subject headings for the specific interests of graduate students and faculty; or it may be a reflection of a transition from the monographic literature to the periodical literature as the more timely source of information in the more focused fields of the graduate students and faculty. The range of needs of users does indicate that the online catalog will perform less well for a large fraction of the users of the library if it is designed to meet only the needs of the faculty.

How well did the online catalog perform in meeting the information needs of those who consulted it? Table 49 from the Final Report summarized the results as follows:

TABLE 4

AMOUNT OF RELEVANT MATERIAL FOUND IN THE ONLINE CATALOG SEARCH

RESPONSE	PERCENT
More than I was looking for	16.6
All that I was looking for	27.5
Some of what I was looking for	39.6
Nothing I was looking for	16.3

Bishop broke these aggregate results down by specific systems or type of library as follows:

TABLE 5

AMOUNT OF INFORMATION FOUND WHEN USING AN ONLINE CATALOG

LIBRARY/TYPE OF LIBRARY	MORE THAN	ALL	SOME	NOTHING
PUBLIC LIBRARIES	19.7%	31.7%	34.1%	14.6%
ARL LIBRARIES	14.8	26.3	40.2	18.7
MELVYL (U OF CAL)	11.8	13.5	43.2	31.5
SYRACUSE UNIVERSITY	14.7	25.8	40.6	18.9
OHIO STATE UNIVERSITY	19.5	31.4	37.3	11.9

Bishop's analysis seems to show that the performance of all systems in the aggregrate is adversely affected by the rather poor performance of the MELVYL system; the performance of MELVYL is undoubtedly severely affected by

the lack of currency of the database. (The MELVYL system is a prototype and the database at the time of the survey included approximately 730,000 records for monographs cataloged from 1976 through 1980. These records represented 1.3 million books in the combined collections of all the campuses.) If the MELVYL system is dropped from the sample, the percentage of users who found nothing drops to 13.5%; or 86.5% found at least some of what they were looking for.

EDITOR'S NOTE

How does this compare with the card catalog? Lancaster (reference 5) has summarized the results of many catalog use studies. The most relevant seem to be the large scale studies of U.S. libraries done by ALA in 1958 and by Tagliacozzo et al. at the University of Michigan. The ALA study showed a predominance of subject searches over known-item searches by 52% to 48%. The Michigan study leaned the other way with 49.5% known-item, 41.6% subject, and 8.9% "other," according to Lancaster. The success of the ALA reported searches is shown in the following table:

TABLE 6

ALA STUDY, 1958: PATRON FAILURES IN KNOWN-ITEM AND SUBJECT SEARCHES

LIBRARY CATEGORY	KNOWN-ITEM FAILURES	SUBJECT FAILURES
COLLEGE & UNIV TYPE A	40%	23%
COLLEGE & UNIV TYPE B	32	16
COLLEGE & UNIV TYPE C	22	14
COLLEGE & UNIV TYPE D	20	8
LARGE RESEARCH	41	14
SPECIAL PURPOSE	49	25
HIGH SCHOOL	20	17
METROPOLITAN-CENTRAL	37	20
SMALL CITY	31	10
METROPOLITAN-BRANCHES	40	36
AVERAGE	34	20

The failure rates for the Michigan Study (Tagliacozzo) are shown in the following table:

TABLE 7

MICHIGAN STUDY, 1970: PATRON FAILURES

LIBRARIES	KNOWN-ITEM FAILURES	SUBJECT FAILURES
UNIV OF MICHIGAN		
GENERAL LIBRARY	19.0%	15.7%
UNDERGRADUATE LIBRARY	33.5	19.1
MEDICAL LIBRARY	29.1	14.8
ANN ARBOR PUBLIC LIBRARY	39.5	14.4

The Final Report states that 58% of searches in the online catalogs were subject searches and 42% were known-item searches: a higher proportion

of subject searches than reported in either of the card catalog studies. However, if these proportions are applied to the ALA study, the card catalog would have experienced a failure rate of 26%; it would appear that the online catalog performs nearly twice as well as the card catalog. While not comparable, the failure rates from the Michigan study would seem to lead to the same conclusion. The Michigan study did distinguish between failures in the catalog and failures in the collection; the latter being correct failures to find material in a subject or a known-item because there was no such material or item in the collection. Since collection failures cannot be separated from search failures in the online catalog study, only gross failure rates have been compared. The possibility exists, however, that collection failures (or database failures) may have predominated in the online catalog study because of recent budgetary stringencies.

Lancaster also reports on research that indicates that for a sample collection of monographs in psychology, 94% of the substantive words in the Library of Congress Subject Headings (LCSH) assigned to the books also appeared in the title; similar results have been found in comparing journal article titles with medical subject headings. In addition, several of the studies reviewed by Lancaster clearly showed that library users remember title words significantly better than they do author names. Both these findings lend credence to the consensus of the conferees that keyword searching was highly desirable in an online catalog.

Thus, the survey indicated clearly that the online catalog provided better access than prior studies had shown the card catalog could provide. It further showed that the online catalog seemed to meet a need for subject

searching not met well by current card, book or COM catalogs. It was against this background of new information from the survey and the growing introduction of online catalogs that the conferees met to define and address the issues involved in the orderly introduction of this new technology.

III. SUMMARY OF THE MEETING

The conference began with a presentation by C. Lee Jones, program officer at the Council on Library Resources. Jones summarized the history of the Council and its transition from being exclusively supported by the Ford Foundation to its present situation in which it receives support from a variety of foundations. He reported that the Council was mounting new programs including one on access to library materials and another in the area of technology as an element in the development of library systems and services. He identified the relationship between the survey and the conference to the Bibliographic Service Development Program which has as its goals:

1. The provision of effective bibliographic services for all who need them;
2. Improvement of bibliographic products; and
3. The purposeful control of costs of bibliographic processes and services in individual libraries.

The Council has pursued these goals through its efforts to establish a nationwide bibliographic service, its promotion of cooperation between bibliographic service agencies serving academic and research libraries, its sponsorship of the development of a national authority file service, and its efforts to support the linking of bibliographic databases. Most recently it has undertaken a set of projects in the area of subject access.

Jones then introduced speakers who had prepared background material for the conference.

Gary Lawrence, from the Library Studies and Research Division of the University of California Systemwide Administration, reviewed the results of the online catalog study reported in the Final Report. He first noted that reports from other project participants would contain additional material. The RLG Report contains material from interviews with users and library public service staff and it is expected that subsequent reports from OCLC and the University of California will contain the results of analyses of transaction logs. The Final Report dealt only with the questionnaire survey results. The major part of his presentation covered the summary of the results of the Final Report which is included, with minor editing, below:

> Most users of online catalogs (OLCs) are frequent users of libraries and of other library catalogs (e.g., card catalogs), but not necessarily users of other computer systems. Most users first discover the OLC by seeing its terminals in the library. Although the difference is not large, older patrons and women are less likely to be users of the OLC.
>
> Non-users (library users who have never used the OLC) think that they can learn to use the online catalog quickly and easily, show an overwhelmingly favorable attitude toward online catalogs, often think they will prefer it to the card catalog, and say they are likely to use it in the future. The reasons most often given for not using the OLC are lack of time to learn about it, and not having taken training to use it. A more detailed analysis of these data, however, suggests that most patrons who do not use the online catalog are infrequent users of libraries and of library catalogs in general.
>
> Most OLC users conduct subject searches; even in academic libraries, the amount of subject searching is roughly equal to the amount of "known-item" searching. There is little apparent demand for detailed bibliographic information. As much as 40 percent of all searches involve

use of multiple access points, but it was observed that some users do not actually use all the information they bring to a search.

The most serious problems experienced by users during their OLC searches involve: increasing the search result when too little is retrieved; finding the correct subject term for their search; remembering what materials are included in the OLC; limiting large retrievals; using truncation during the search; controlling the search process; and slow response from the computer. Few clear relationships between searching problems and the various features used by OLCs to address them were found, but there is evidence that while many system features are indeed helpful in specific situations, they may be difficult to use and their presence can serve to confuse as much as to assist the user.

When users get help during a search, most get it from signs and brochures or from the OLC system itself. First-time users are an exception; they rely chiefly on library staff for assistance. Assistance and instruction provided online can help, but only if a goodly amount is available--a little online instruction may be worse than none at all. Most users expressed concern about availability of terminals, and about the availability and quality of printed aids. One of the chief problems was the inadequacy of writing space at the OLC terminal. Use of printers was also a frequently-mentioned problem.

Users appear satisfied with the online catalog. About 80 percent find some relevant material during a search, and a similar percentage expresses satisfaction with the search results. About half the users also find things of interest that they were not specifically looking for. Over 90 percent have a favorable attitude to the OLC in general, and 75 percent prefer it to the catalog form it replaces or supplements; only 9 percent indicate a clear preference for the card catalog. Frequent users are, on the whole, more successful and more satisfied than infrequent users, but first-time users also show high levels of satisfaction.

When asked what should be done to improve the OLC system, users said they wanted to: view related search terms; search tables of contents and indexes of books; get information on circulation status and availability; and print their search results. To improve access, they want terminals, terminals, and more terminals; more terminals in the library, terminals spread throughout the library, and access from places other than the library. Opinion about what to add to the database was spread rather widely, although the most popular preferences were for newspapers,

government documents, journal titles, and retrospective conversion of older material; only 11 percent could think of nothing they wanted to add.

Users' problems could be organized into seven areas, or factors:

1. Using and understanding codes and abbreviations.
2. Understanding terminal displays.
3. Command and control.
4. Subject searching.
5. Known-item searching.
6. Patience with response time, terminal queuing, and terminal dialog.
7. Library support services.

Analysis shows that effective subject searching is the most important determinant of user satisfaction, followed by library support services, command and control, and known-item searching. Problems with codes and abbreviations and with response time and waiting are less important, and problems in understanding terminal displays have little influence on user satisfaction.

Among the implications of these findings for libraries are:

- The public is willing, even enthusiastic, to accept online catalogs.
- Libraries should make their OLC terminals highly visible and provide plenty of space for writing and for personal belongings.
- Administrators should plan to: provide printers; add lots of terminals; and expand the database.
- To make the OLC attractive to non-users, promote use of the library; the online catalog will promote itself.
- Provide more and better printed aids, and plan to supply online assistance and instruction.
- To improve user satisfaction with the online catalog, improve the system, not the users' training.

Among the implications for designers of online catalog systems:

- When designing new features and capabilities, pay close attention to the user interface; poorly integrated features hinder rather than help.
- Subject searching is important--do what you can to help the user. Specifically, allow users to browse the subject index, headings file, or thesaurus, and institute keyword searching for subjects.
- Clean up the user interface--make it simple, concise, and syntactically consistent; speed up menu displays.
- Provide relatively brief bibliographic displays; make full displays optional.
- Do not give high priority to very short response times; the users are relatively tolerant, and the resources can be used for other system improvements.

Finally, the following are some of the implications for the profession as a whole:

- Enrich subject access. Subject searching is the predominant use of OLCs, and one of the highest priorities for improvement, according to the users.
- Simplify subject access. Help the users find the search terms they are looking for by providing more rigorous vocabulary control or by linking synonymous and related terms.

Joseph Matthews, of J. Matthews and Associates, Inc., continued the presentation on the Final Report by adding that there was a need to sell the non-users on the online catalog; that work space and privacy were needed at the terminal; that a command chart attached to the terminal was highly desirable, but systems should implement command function keys; and that there should be more terminals. The reliability of online catalogs was good, 98-99%

up time, and response times of 5 - 7 seconds seemed acceptable, but 10 - 15 seconds was unacceptable. One issue is what information actually needs to be contained in the records of the online catalog. It is doubtful that all information in the MARC record is required. Keyword searching is required in online catalogs and this implies the necessity of Boolean search capabilities. The need for more work on user-cordial interfaces to the search system and the need for ensuring that the user retains control of the search process must be recognized. The group was reminded that Pauline Atherton Cochrane is chairing a subcommittee of committee Z39 of the American National Standards Institute to develop standards for commands used in online search systems. (Editor's note: A working paper from Subcommittee G appears in: Cochrane, Pauline A. "Can a Standard for an Online Common Command Language be Developed?" ONLINE. January 1983. p.36-37.) Standards for display of bibliographic information are also needed. Matthews believes that systems need many improvements for subject searching, including access to "see" and "see also" references, and assistance in correcting user errors instead of rejecting them. The survey showed that users responded very favorably to the online catalog and showed a "halo" effect, sometimes even failing to notice problems.

(Editor's note: While not specifically addressed during the conference, the Research Libraries Group Report to the Council on RLG's part of the online catalog study formed a basis for some of the discussion. The summary of that report is therefore included as APPENDIX D and should be considered a companion to the Final Report. Summaries from the online catalog project reports by J. Matthews and Associates, the Library of Congress, and OCLC are included as APPENDICES E-I. Two additional reports from the

University of California are summarized in APPENDICES J-K. All reports from the online public access catalog study have been submitted to ERIC.)

The presentations on the Final Report were followed by an oral report from David Bishop, Director of the University of Georgia Libraries, on his review of selected questionnaire data as seen by a research library administrator. He selected for review the data on three specific systems: the system of the University of California, MELVYL; the Syracuse University system, SULIRS; and the Ohio State University system. Each of these systems was represented in the survey by about 1250 responses, while other research library systems were represented by smaller samples. He compared the results for these systems with those from the public libraries in the survey. It was pointed out that the fact that MELVYL was a prototype system may have affected the results, because the incomplete database led users to do more subject searching than they might have done on a full, current file. Bishop was most surprised by the similarity between public and research library results and by the difference between the results from MELVYL and OSU, the former being used predominantly for subject searching while the latter was used primarily for known-item searching. 31.5% of MELVYL users found nothing of use while only 11.9% of OSU users found nothing. Discussion revealed that subject search capability was added long after the author and title search capabilities to the OSU system and that this, as well as the limited MELVYL database, might also affect the results. (Bishop's written report, completed after the conference, is included as APPENDIX C.)

Bishop's presentation was followed by a general discussion of the impact of online catalogs. It was reported that at Mankato State University there was a surge for the first two to three months in the use of the online

catalog upon its introduction, followed by a more stable level of use that represented about three times the number of uses that had been made of the card catalog previously. Also, each user was spending more time at the computer catalog than he/she had at the card catalog. This was paralleled by an increase of about 15% in the overall usage of the collection. At OSU, usage of the online catalog has grown substantially over the past year: in 1981, October and November statistics showed about 1.3 million transactions for each month; in 1982, these rates had gone to 1.75 and 1.83 million for October and November, respectively. This represents an increase of about 40% in one year for a mature system where there was no increase in faculty or student enrollment to account for the change. It was further reported that the Pikes Peak Regional Library system had over 600 dial-in users, using the online catalog from home mostly at night.

Gary Lawrence then reported on the Cost/Features Document. The Cost/Features Document was a draft prepared specifically for discussion at the Conference. Rather than giving an overview of the document, however, he focused on the issues that he considered to have the greatest impact on system costs. These were as follows:

1. Database size
2. Terminals
3. Keyword searching
4. Boolean search capabilities
5. Search limiting capabilities
6. Authority control
7. Backup
8. Multiple functions and system linkages

Relative to these issues, database size is an obviously important element in the cost of the system, but, in addition, system designers must

realize that the database will grow both through the addition of material of the same type it contains originally and through the addition of new types of materials. Terminals may be one of the highest cost items in the system both because of the number required and because of the high cost of communications for remote terminals. The importance of keyword searching, the need for Boolean operations on the results of a search, and the capability to limit the results by type of material and publication year all require attention. Lawrence questioned the high investment now being made in name authority control, but he believes that some control over subject terms might be desirable. The impact of authority control on system costs was unclear, with participants alleging both additions to cost (in development) and system efficiencies (for the user). System backup can be handled in any of three ways: provide none; provide backup in another medium, such as computer-output-microfilm (COM); or provide redundant hardware. These have varying costs from zero for no backup to more than double the cost of the system for full redundancy. The addition of other functions and system linkages can also affect the cost of the system. One should consider at least the addition and integration of the circulation system into the online catalog, but other candidates include the on-order and in-process files and perhaps word processing support for users. System linkages have yet to be developed and addressed as cost elements.

The discussion following this report focused both on the presentation and on the Cost/Features Document itself. The first major discussion point was the costs assumed for conversion of the database. The total cost of cataloging an item was said to be nearly $20 per monograph, whereas the estimate of $2 used in the study was only for preparing machine-readable

records. Creating and maintaining the database should be recognized as one of the major costs for either a manual or an automated system. The cost of hardware is dropping in the sense that price/performance ratios are improving, doubling every three to five years. The cost of software, the programs that make the hardware do something useful, is not decreasing but increasing. Thus, as time goes by, the database and the software are becoming dominant cost centers. It was agreed that the Cost/Features Document's distinction between the costs of minicomputer systems vs. those for larger mainframe computers was not very useful and that the cost information used in the document was dated. An important observation was that the character set used in a system had a very significant impact on the cost of terminals. A terminal that can display the entire ALA character set is two to three times as expensive as one that handles only the ASCII character set. The addition of printers also has a high impact on costs.

After this discussion, the conferees broke into working groups to address the issues raised by Jones at the beginning of the conference. A summary of the working group results is contained in the next section.

IV. WORKING GROUP CONCLUSIONS

Each conference participant was assigned to a working group and each group was asked to address the specific set of issues given below with regard to the draft report on the costs and features of online catalogs and with regard to the direction in which leadership for the development of online catalogs should proceed. Each working group was asked to address all issues; depending on reactions to issues 2 and 3, number 4 might not need to be addressed. The conclusions of the working groups exhibited similarities and differences of opinion.

The four working groups discussed and prepared comments on the following topics:

1. Comments or recommendations on the Cost/Features Document.
2. Is it possible at this time to describe the characteristics of an "ideal" online catalog system for a research library? If so, what characteristics might be included?
3. Is it time for standards or guidelines for online catalogs in research libraries? If so, what standards or guidelines are needed?
4. What additional research is required to be able to do either of the above if insufficient information is now available?
5. Are there generalizable strategies for the implementation of online catalog systems in research libraries, and, if so, how can they be described?

6. What other problems related to online catalogs in research libraries require attention?

The following is a summary of the working groups' reports by topic.

1. COMMENTS OR RECOMMENDATIONS ON THE COST/FEATURES DOCUMENT.

Group I:

The Cost/Features Document could be a useful informational document addressed to library administrators and planners. It needs more of a focus on the overall online catalog system and less distinction between mainframe and minicomputer-based catalogs. There is some question about the accuracy of the cost estimates included; there is comparatively little information about present systems; there needs to be a recognition of all the variables involved and of the unique features of individual situations. It would be useful to include some reference to displaceable or transferable costs and to areas of cost avoidance. Another helpful element would be the inclusion of information regarding how implementation of present systems has been managed financially. Realistic estimates of the costs of online catalogs should be presented, but the presentation should not be intimidating.

Group II:

The Cost/Features Document is greatly needed; it represents a good start but needs further development. There was concern that the document as written could scare off administrators; it needs to be accurate, but should have as positive a tone as possible. The document structure should be an expanded summary with appendices that deal with particular issues in detail.

The cost model needs to be more sophisticated, and the specific costs cited need to be updated to reflect those that would apply now. Those areas of costs that are particularly volatile should be identified and trends given for those that are changing. The document should address more explicitly cost components and examine the impact of specific features on these costs, e.g., decentralized access. Specifically, the following issues need to be addressed:

a. The impact on the cost of terminals of the ALA character set vs. the standard ASCII character set.

b. The impact of incorporating intelligence in the terminals to reduce communication and central processor costs.

c. Staff costs should be itemized (rather than estimated in dollars) since situations vary so widely.

d. Definitions should be given for terms used in the document.

e. The document should describe in detail alternative designs for Boolean searching.

f. The document should point out that, if the online catalog is part of an integrated system, costs would be distributed among various system functions.

g. The document should provide more information on the costs of authority control.

Group III:

The Cost/Features Document can be characterized as an excellent working paper in an area where libraries really need help. Comments on the report could best be provided in writing to CLR, and the Council should propose a deadline for such written comments. The following are some general comments:

a. Cost data should be as up to date as possible.

b. Information about features and costs of existing and proposed systems should be as up to date as possible.

c. It appears that we are now faced with a whole continuum of machines, rather than having just minicomputers on the one hand and mainframes on the other. Perhaps one way to lessen the mini versus mainframe tone of the existing document would be to talk about the continuum.

d. Could a few case studies involving costs be presented in the document?

e. Is it possible to talk about what it costs not to have an online catalog, or are results such as user frustration and failed searches too elusive to attach figures to?

f. It might be helpful to talk about costs in two ways: (1) the basic system costs, and (2) the costs for terminals and storage, which vary with database size and the size of the user population at each institution.

g. The kinds of costs referred to in the report should be described more explicitly.

h. The criteria for system selection should include include such possibilities as allowing for future communication with other systems, expansion of features, etc.

i. When the document describes criteria for system selection, could it describe more fully the probable future in which there will be a proliferation of library networks that scholars will expect to see interconnected?

Group IV:

The Cost/Features Document should be written for the library administrator and higher managers in the university or municipal system, and because of this it needs to be more highly summarized. The cost figures need to be updated, but it should be recognized that they will always be only approximations. The study might usefully take a representative set of systems, say five, and give the market costs to purchase and install these systems at the present time and identify the functions and features supported

by each. On the basis of this representative information, the costs could be generalized for other comparable system sizes and capabilities. Hardware costs should be broken down into separate elements: CPU, controllers, storage, programming, etc. The study should point out those areas where technological innovation can be expected to materially change such systems, e.g., voice input. The cost study should address the post-development and maintenance cost of systems. Such costs include database and system conversion cost; test/shakedown costs; production costs for hardware, operating system, and application programs; hardware replacement; and costs for staff, including analysts, applications programmers, systems programmers, operators, and telecommunication personnel.

(Editor's note: A final version of the Cost/Features document is expected to be available from CLR by July or August 1983.)

2. IS IT POSSIBLE AT THIS TIME TO DESCRIBE THE CHARACTERISTICS OF AN "IDEAL" ONLINE CATALOG SYSTEM FOR A RESEARCH LIBRARY? IF SO, WHAT CHARACTERISTICS MIGHT BE INCLUDED?

Group I:

While data are still sparse, experience relatively short, and controlled studies nearly non-existent, it is possible and desirable to begin describing the best system possible for development in the next five years--given what we know and the present state of the art--with an imperative for ongoing review, research, and evaluation.

Group II:

It is time to try to begin to describe the characteristics of the "ideal" online catalog system; such description should not be considered prescriptive, however, because the capabilities of online catalogs are developing rapidly. Agreement is needed on certain characteristics more urgently than on others because they are more substantive and important. Specifically, a good online catalog should have the following capabilities:

a. Author, title, and subject access.

b. Linkage of bibliographic information with availability information.

c. A switching capability to allow users to search more than one database.

d. Printed output and products.

e. Dial-up access, including from the simplest, cheapest terminals.

f. Allow the connection of the catalog system to a user's personal computer system.

g. Access to all formats of materials regardless of media; the database should contain everything.

h. Inclusion of journal articles from selected disciplines, with author and subject access.

i. Provide for expansion of information detail, e.g., abstracts, articles, full text.

j. Provide for repeat of previous command.

k. Avoid responses that imply that the user is wrong; instead the system should prompt for the probable next correct action.

l. Online catalog systems should, when appropriate, prompt the user to consult the librarian.

m. Provide for minimal dependence on systems personnel.

Group III:

It is not possible at this time to define an ideal system. The research identified below (Group III's response to issue number 4) needs to be done before such a definition can be attempted. Premature definition would be counterproductive.

Group IV:

It is possible to begin to identify characteristics of an "ideal" online catalog, but such an effort must look to the future of such tools and not concentrate on what exists already. It might result in a checklist of desirable features and capabilities, but this should not be interpreted as a standard. One would have to keep in mind the difference between hypothetical capabilities and the ideal online catalog system. Among the areas deserving attention in the description of an ideal system should be the following:

a. The content of the database, including retrospective conversion and how users are to be kept informed of the scope of the database and system capabilities.

b. The interconnection of the system with other systems, including those containing other formats of bibliographic information and the library's document delivery system.

c. The indexing of the material, including access points for keywords and the provision of Boolean search capabilities.

d. The syndetic structure of the search vocabulary, including authority control, browse functions, and cross references.

e. The display of bibliographic information, including the choice of terminals, the character set, the availability of slave printers, and telecommunication protocols.

f. System backup, including alternative media vs. redundancy.

3. IS IT TIME FOR STANDARDS OR GUIDELINES FOR ONLINE CATALOGS IN RESEARCH LIBRARIES? IF SO, WHAT RESEARCH OR GUIDELINES ARE NEEDED?

Group I:

While it is premature to establish standards, it would be appropriate to establish guidelines in the areas of command syntax and semantics, data structures, and display formats. CLR should encourage the preparation of a document or documents in these areas for review and discussion by the research library community. Such document(s) could best be prepared by an assigned individual assisted by a small advisory committee.

Group II:

There is a need for standards or guidelines; a more uniform terminology is needed for the description of systems. Features present in more that one system should follow a common approach. The adoption of standards or guidelines should not, however, lead to stifling development of new options or approaches. The objectives of standards or guidelines should be the following:

a. To help systems communicate with each other;

b. To help users move from one system to another; and

c. To help control the costs of online catalogs by simplifying protocols.

Group III:

We are at the point where we need guidelines or minimal standards for online catalog system development. However, we cannot intelligently formulate such guidelines until we are in possession of more information. While it is

true that we know much more about online catalogs than we did two years ago, at least three user interface issues require further clarification. They are as follows:

a. We need to know more about the display of bibliographic data. It appears that there already is a large body of industrial research relating to optimal positioning of data elements on the screen, optimal typographic conventions, usefulness of data labels, and so forth, but it is not widely disseminated in the library field. Can the Council help with the preparation of a state-of-the-art review and perhaps also help to support further research if it is found to be necessary?

b. We need to know more about which data elements in bibliographic records should be included in which system as access points. In the process of exploring this topic, questions of stoplists and authority control may arise. Also, we can expect this problem to grow as more kinds of data are added to the online catalog. As in (a) above, both state-of-the-art reporting and some research would be useful here.

c. We need to know more about the process of the user's dialogue when searching the online catalog. There seem to be newer alternatives to menu-driven dialogue and command language. What are they? Can these techniques truly allow the user to communicate more effectively with the machine? Again, state-of-the-art investigation and perhaps new research seem called for.

When we have these kinds of questions answered, we will be in a position to describe how the ideal online catalog should work.

As a postscript, Group III would like to point out that this small group discussion resulted in the exchange of some useful technical information among system designers, and this exchange should prove to be a positive by-product of convening this meeting at Wye.

Group IV:

There is a need for a standard for the display of bibliographic information. Such a standard should provide for a brief display and the order of the elements in the display. Expanded displays should also be standardized. The need for such a standard implies the need for research on user evaluation of the existing and potential display of bibliographic information with attention to the differences between display terminals that provided 80 x 24 character displays versus those that provide 64 x 16. The issue of canned vs. user-tailored displays needs review as part of this effort. In addition, standards for searching should be developed with the proviso that they apply only to those systems that implement a specific capability.

4. WHAT ADDITIONAL RESEARCH IS REQUIRED TO BE ABLE TO DO EITHER OF THE ABOVE (ITEMS 2 AND 3) IF INSUFFICIENT INFORMATION IS NOW AVAILABLE?

Group I:

Group I did not think that additional research is required before work can begin on items 2 and 3.

Group II:

Research is needed in the following areas:

a. Emerging characteristics of new and existing systems.

b. Specific bibliographic information required by users, and definition of a standard "brief" bibliographic display.

c. Subject access, including improving the usefulness of the Library of Congress Subject Headings and the addition of specific disciplinary vocabularies. Research should be undertaken on the alternatives to a universal thesaurus.

d. Review of the research in the man-machine interface (e.g., displays, command language, use of color, and file security) and what has been done in fields other than library automation to preclude unnecessary research and errors in the development of online catalog systems.

e. Relationship of the capabilities and use of online catalogs and the actual use of library materials.

f. Cost/performance tradeoffs of specific system capabilities.

g. Cost savings resulting from library automation.

Some way should be found to provide higher visibility to distinctive performance in the development of online catalogs.

Group III and Group IV:

Groups III and IV did not address this issue.

5. ARE THERE GENERALIZABLE STRATEGIES FOR THE IMPLEMENTATION OF ONLINE CATALOGS IN RESEARCH LIBRARIES, AND, IF SO, HOW CAN THEY BE DESCRIBED?

Group I:

A beginning can be made on the development of a generalizable strategy for the introduction of online catalogs into research libraries. While the process of implementation must be institution specific, the development of appropriate models for planning and implementation management and the identification of evaluation criteria should be helpful. Further, the accumulated experience of successful implementers should be gathered for

distribution. A prime factor in the effort must be the engagement of university and library staff in a feeling of ownership in the system. It is important to have an identification of the various cost elements with a consideration of the utility of each and tradeoffs.

Group II:

A national effort is required to develop a generalized strategy for the implementation of online catalogs. CLR and others should be encouraged to develop presentations to university administrators, faculty, and scholarly societies about the issues relating to online catalogs.

Individual campuses and universities need to have developed and explained the alternatives for capital formation, including loans and cost sharing with other institutions. Universities should be sold on the concept of investing to improve the already very large investment in their libraries. The cost-saving potential of online catalogs needs to be carefully identified. Universities should investigate the entrepreneurial use of online catalogs, e.g., making services available to business on a fee-for-service basis. Finally, the support of other elements of the university should be obtained by providing services such as word processing.

Group III:

It is important that we develop successful strategies for bringing university administrators and faculty members up-to-date about our online catalog needs. We cannot allow ourselves to get into the position that many university science departments have, namely that they have obsolete laboratory equipment because their arguments for newer machines have been repeatedly

ignored. Recognizing that there are many worthy constituencies competing for scarce university resources, we need to present more sophisticated online catalog justifications; saying "this is a very useful tool" is not enough.

It is not safe to generalize about the best way to educate academic administrators and opinion-makers about online catalogs; a variety of techniques will doubtless be necessary. Group III commended the Council for its efforts to forge closer alliances with other academic professional groups and urged the Council to continue to find ways to bring the online catalog issue to the attention of other groups. There is a need for some kind of written online catalog documentation directed at the above mentioned academic audience. Can the Council help to prepare it so that each institution does not have to do it separately?

Other pertinent questions: What do we know about creative financing schemes that make online catalog installation more manageable fiscally? Have some institutions developed successful approaches that could be reported as case studies? Does it help to talk about how online catalogs can create increased collection use, or would university administrators be unconvinced by such an approach?

Group IV:

There is a need for one person to summarize the experience of those institutions that have already implemented online catalog systems.

6. WHAT OTHER PROBLEMS RELATED TO ONLINE CATALOGS IN RESEARCH LIBRARIES REQUIRE ATTENTION?

Group I:

The following areas need study or attention: the database, including retrospective conversion; telecommunication protocols for the interface between online catalog systems; identification of the types of linkages desired; and allocation of system development and operation costs.

Group II:

Strategies for the implementation of new modes of access need to be given more attention in order to optimize the use of the limited resources available for the implementation of online catalog systems; in particular, staging the systems by type of record should be studied and differences in access requirements by discipline should be examined. The differences in use and need between undergraduates, graduate students, and faculty require attention. Methods for the scholary community to monitor the performance of systems is needed so that the new technologies can be assured of contributing to and not constraining the intellectual processes of scholarship. Finally, the relationship between online catalogs and other university computing needs attention because these areas represent related parts of the university information system.

Group III:

Group III did not address this issue.

Group IV:

There is an urgent need to begin to develop a concept for the creation of an online Union Catalog to assist research libraries in searching and locating materials anywhere in the nation. Such a Union Catalog might be separated into segments at various locations with responsibilities assigned for specific types of material.

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After the reports from the working groups, there was some discussion but differences were not resolved. Richard DeGennaro was asked for his impression of the discussion to this point in the conference. He indicated that he was somewhat concerned that the conference might give the impression that complete and comprehensive online catalog systems already exist and are available for installation, but the reality is that they are not yet available in the marketplace. In the field of library technology there is always a big difference between the systems that are actually available for use in libraries and those that are under development or promised for delivery in the future. He said it was important for both system planners and library managers to distinguish between operational systems and systems that are under development, and to keep a firm grip on reality.

V. CONSENSUS OF THE CONFERENCE

In the final session of the conference Warren J. Haas, president of the Council on Library Resources, proposed the following assertions as the consensus of the meeting:

1. The concept of online catalogs is being rapidly accepted, and in plus/minus 5 years there will be operating systems in a great many academic, public and specialized libraries.

2. Online catalogs represent a fundamental change in the process of identifying and locating recorded information because:

    a) of their unmatched search capabilities

    b) of their ability to be instantaneously updated

    c) of the prospect of their being linked electronically to other online catalogs

    d) they use terminal, computing and communication technologies that seem likely, over time, to be employed in many other aspects of scholarly communication (access to data, text, etc.)

    Further, online catalogs present an opportunity to redeploy library staff and increase productivity of staff and users.

3. In large libraries, at least, there is some prospect that total five-year costs for installing and operating online catalogs (for prospectively generated records) will be little or no greater than continuing with 3x5 cards. (Many conditions and implementation decisions might modify this statement.)

4. System capabilities, record configuration, and database size govern installation and operating costs. In

general, standardization of system capabilities and coordination among libraries in terms of record generation will help contain costs.

5. Online catalogs should significantly enhance the research process and, given conscious attention to the matter, will not impede, but facilitate, the work of scholars.

6. Online catalogs can improve access to information nationally and internationally, and may stimulate productive use of recorded information by the public at large.

The conferees agreed in general with these conclusions with the exception of number 3. Many of the conferees believed that the cost of online catalogs would exceed those of the card catalog, though this might vary from one situation to another. Real savings might be possible if the catalog system were part of an integrated system including other library functions such as acquisition, circulation, and location of materials, and the system was used to streamline the operation of the library and support cooperative acquisition activities. It might, however, be very hard to identify the savings because of the nature of library accounting practices and the difficulty of comparing the five-year costs of the computerized system with what might have been the five-year costs of the manual system.

Conclusion 5 also occasioned discussion which illuminated a schism in the attitudes of developers of online catalog systems. Some thought it too negatively expressed, being convinced that the online catalog could only be better than the card or COM catalog. The split among developers is reflected in their views of the future of catalogs: one group sees the opportunity for the incorporation of artificial intelligence in the search processes to insure that the system performs the best practicable search based on the information provided by the user; the other group sees the system as needing to be kept as

simple as possible, or as intelligible as possible, so the the user will understand what he has done and what can be done to improve his search. Those with the latter attitude believe that systems should be developed which operate in a way that avoids mystifying users.

(Editor's note: The validity of the latter attitude was demonstrated by the LEADERMART system at Lehigh University that did everything for the users and left them helpless to understand what it had done or how to get what they really wanted.)

On the other hand, some intelligence in the system seems to be demanded by all users that ask why the system can tell them exactly what is wrong with what they have done but will not go ahead and correct it and do what they wanted to do. The balancing of computer "help" with intelligibility will be a major challenge for systems. Faculty should be involved in the process of defining and improving online catalog systems.

A third theme that arose regularly during the conference was that of system flexibility. It was repeatedly noted that systems should be implemented in ways that allowed them to change and grow. The most common example of a dead-end system is one on a computer that is the largest of its line and for which there is no larger compatible replacement. The experience of operational systems seems clear: the demands on the system are not completely predictable; there probably will be more use than anticipated; and new capabilities will be demanded that require more computational capability, more channel capacity, and more storage. The growing use of home computers can be expected to have a profound effect on the use of the catalog from outside the library, and online catalog systems should be implemented in a way that does not foreclose the possibility of such use. It should be noted that

software systems can also impose serious limits to the growth of use or the addition of capabilities. The proper selection of online catalog systems by library administrators should perhaps depend more on future flexibility than on the specific present capabilities of alternative systems.

VI. CONCLUDING COMMENTS

At the conclusion of the conference each conferee was asked for his or her reaction to, or comments on, the meeting. Haas began by noting that he believed that the conference had made reasonable progress toward its goals. DeGennaro provided some advice to system designers. He first emphasized that online catalog systems should be kept as simple as practicable but that they should be built with the recognition that they will have to grow; their architecture, hardware and software, should not preclude graceful growth. Few libraries should design and implement their own systems, and there is a need for turnkey systems. Retrospective conversion should be addressed in the development of such systems. The original cost of cataloging the older material was $20 to $30 per item; the cost to convert it would be one to two dollars per item. While this cost may loom large to a library, the cost of conversion is low compared to the original cost of the information, and this clearly argues in favor of conversion. Finally, he stated that he wanted a dedicated system for his own library. He was uncomfortable about being dependent for local functions on the bibliographic utilities (OCLC, RLIN) or on regional arrangements.

The comments of the conferees continued with repeated remarks on the exceptional benefits each had derived from the conference and on the need for a good cost model for the development and installation of online catalog systems. The conferees believed that the online catalog received two to three

times the use of the card catalog and thus greatly increased access to and use of the library collection. It was noted that for multi-library systems the cost of communications would become the dominant cost because they are now high and are not dropping at the same rate as computer costs. It was further noted that libraries need a way to "bootstrap" their development of online catalog systems because the money to support the installation of such systems will have to come from already austere budgets. There were repeated remarks about the necessity of staying alert to the availability of new technologies that will affect the direction online catalog systems take. New storage technologies, database processors, and the application of artificial intelligence were cited as developments that could have major impacts.

Several conferees expressed gratitude to the Council for its continuing important efforts to inform, support, and coordinate many of the developmental activities of the library community. Most of the conferees also indicated that the chance to become acquainted with their peers in the online catalog development arena was very valuable.

Another theme that seemed pervasive was the concern over the relationship between the level of detail maintained in the bibliographic record (the MARC communication format) and that appropriate for online catalogs; the difference between printing cards and providing online services is substantial, and it seems evident that the information required to print cards exceeds that necessary for online retrieval. In this, as in other aspects of online catalogs, there is a need to test alternative approaches and to carefully review the results in order to assure the evolution of more effective systems.

The shortage of personnel qualified to manage or develop online catalog systems was also addressed. People with the necessary training are not being produced by library schools. While MLS students are now being taught about online searching on the big database systems provided by vendors such as Lockheed, SDC, and BRS, they are not being given the background required to select, install, and operate online catalog or online circulation systems. The pool of personnel with appropriate experience or training is very small. The library community needs more experienced people if it is to avoid costly mistakes.

Several of the conferees remarked on the fact that the meeting was made up of "True Believers" (in the sense established by Eric Hoffer) in that the attendees were predisposed to treat the online catalog as more important and more imminent than it in fact may be.

Most of the conferees saw the online catalog as a symptomatic and fundamental issue for libraries. The online catalog is a beginning toward systems that deliver information beyond the walls of the library. Personal computers will be extensively used from businesses and homes for access to information services. This process has begun. If libraries do not move to keep up with this new technology for information delivery, libraries could become intellectual backwaters. As online catalogs come into wide-spread use, retrospective conversion will become even more important. The material in old card catalogs will become functionally unavailable unless it is converted. A national approach to this massive undertaking may be required.

VII. RECOMMENDATIONS

As a result of the conference there seems to be a series of recommendations on which there was consensus for library administrators, library system designers, and for the Council on Library Resources. These recommendations are as follows:

1. Recommendations to library administrators:

Library administrators should make themselves aware of the ongoing developments in online catalogs. They should be aware that the adoption of online catalogs is proceeding apace, and that they can expect mounting pressure to match the capabilities of other institutions. They should attempt to develop costs for their existing operations so that they will be in a position to explore realistically the alternatives that become available to them. If they become involved in planning and installing an online catalog, they should bear in mind that it will grow faster than they foresee, will require more terminals than they imagine, and will result in higher usage of the other services of the library. In view of this growth potential, they should insure that the system they select has growth potential and is not constrained by hardware or software from meeting the needs of the future.

2. Recommendations to library systems designers:

Before starting the development of a new system, review those developed elsewhere; the Not-Invented-Here syndrome requiring every library to develop a new system should be avoided because developmental costs cannot be born by most libraries. Acquiring, installing, and enhancing an existing, proven system is usually much less expensive than starting from scratch. Subject searching must be designed carefully; it will be heavily used. Access should be provided to a subject index or thesaurus for "see" references. Keyword searching and Boolean operators should be provided. The user interface should be clean and simple. A menu interface suitable for the novice user cannot stand alone; there must be some way for an experienced user to bypass the menus. Users should be provided with online tutorial information. When possible do not return an error message without fixing the input and trying again. Try to design the system so that increased usage and a growing database combined with urgent user requirements for new capabilities will not cause the system to founder; both hardware and software capabilities need to have the capacity for graceful expansion.

3. Recommendations to the Council on Library Resources:

The Council should continue to support research and communication on the online catalog. It should initiate an effort to produce guidelines for online catalog systems; in this regard, it should monitor the efforts of the Z39 subcommittee to develop standards for commands. Perhaps even more important, it should initiate an effort to standardize the display of

bibliographic information; such an effort could have a significant impact on existing and developing online catalogs and on the information actually retained in the bibliographic record. The conference underlined the importance of two programs of the Council: the subject access improvement effort and the technology impact analysis. These should be pursued vigorously to insure the development of efficient and effective online catalog systems. The Cost/Features Document should be revised and completed in accordance with the suggestions of the working groups. Finally, the Council should undertake and publish a survey, similar to those conducted by Datapro for commercially available software packages, of available online cataloging systems being used by multiple organizations.

VIII. REFERENCES

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APPENDICES

APPENDIX A

LIST OF PARTICIPANTS

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December 14-16, 1982

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APPENDIX B

AGENDA

ONLINE CATALOGS - REQUIREMENTS, CHARACTERISTICS AND COSTS
Aspen Institute, Wye Plantation, Queenstown, Maryland
December 14-16, 1982

Tuesday, December 14, 1982

5:30-6:00 p.m. Cocktails

6:00-6:45 Dinner

7:00-8:30 Program Session I

Welcome

Introduction of Participants (Lee Jones)

The Council on Library Resources and the Bibliographic Service Development Program (BSDP) (Lee Jones)

The Online Public Access Catalog Study: the Process (Lee Jones)

Results and implications of the results of the Online Public Access Catalog Study (Gary Lawrence and Joe Matthews)

Outline of the plan of action for the rest of the meeting

Wednesday, December 15, 1982

8:15-9:00 a.m. Breakfast

9:00-11:00 Program Session II

Presentations and Discussion:

Presentation 1: Review of data from the Online Public Access Catalog Study from a research library manager's point of view (Dave Bishop)

Presentation 2: Features and cost factors in online catalogs (Gary Lawrence and Joe Matthews)

11:00-11:15	Identification of issues to be discussed (Lee Jones)
11:15-Noon	Begin work in groups to identify options for action
Noon-1:15 p.m.	Lunch
1:30-4:00	Program Session III
	Continue work in groups to identify options for action
4:00-5:30	Recreation time
5:30-6:00	Cocktails
6:00-7:00	Dinner
7:00-8:30	Program Session IV
	Reports by group reporters and discussion

Thursday, December 16, 1982

8:15-9:00 a.m.	Breakfast
9:00-11:45	Program Session V
	Further discussion and summary
11:45	Program concludes

APPENDIX C

THE CLR ONLINE PUBLIC ACCESS CATALOG STUDY: AN ANALYSIS OF ARL USER RESPONSES

A Report Prepared for the Council on Library Resources
by
David F. Bishop
March 15, 1983

Introduction

This study analyzes questionnaire responses of users of Association of Research Libraries (ARL) libraries who participated in the Council on Library Resources (CLR) Online Public Access Catalog Study and compares them with the responses of public library users. The study also analyzes questionnaire data from three individual ARL libraries and compares them to the data from all ARL libraries in the study and to each other. Of particular interest is whether different system capabilities affect users' responses and, if so, how. The study focuses primarily on the first part of the four-part user questionnaire which deals with questions about the type of information people bring and use when they search an online catalog, how and why they search, how much they retrieve, and how satisfied they are with the results. The responses to these questions are compared with the characteristics of the respondents found in the fourth part of the questionnaire. The user characteristics of particular interest are frequency of use of the library, the academic area of the respondent, and the academic status of the respondent--whether undergraduate, graduate student, faculty member, etc.

The individual ARL online catalog systems selected for this analysis were the MELVYL system used on the nine campuses of the University of California, the Syracuse University SULIRS system, and the Ohio State LCS system. The primary reason for selecting these was that they represented the overwhelming majority of ARL responses in the survey. Of the 4,701 total ARL library responses, these three systems provided 3,845 (81.8%). The four remaining ARL libraries produced only 856 responses, with no one institution having enough responses to be very useful for analysis.

Limitations of the Survey

As with any survey there are a number of problems with the data that were collected. One problem is the very high rate of incomplete responses from users of the MELVYL system. The MELVYL questionnaire was administered online following the completion of a searching session. In a number of cases the person filling out the questionnaire stopped before completing it, resulting in between two and three hundred invalid MELVYL responses for each cross-tabulation. If one assumes that the responses of those who did not

complete the questionnaire are statistically similar to the responses of those who did, there would be no need for concern. But, if people who were dissatisfied expressed that dissatisfaction by failing to complete the questionnaire, then some of the conclusions may be suspect.

Also, there is a problem with differences in the databases of the selected systems during the data collection period. The MELVYL database was a static prototype, and had had no records added since 1981. The Ohio State database was and is currently maintained and represents all of that institution's holdings; however, subject headings exist only for records added in the last five years. As will be seen later the differences in these databases affect the way users responded to various questions.

Information Users Bring to a Search

In spite of these difficulties, an analysis of the responses shows a number of interesting findings. Table 1 indicates what information users bring to their searches. It is evident that differences exist between the responses of ARL library users and public library users, but they are not dramatic. The percentage of people who bring author information to their search is somewhat higher for ARL users than for public library users, but the difference in the percentage of people bringing title or subject information between the two groups is slight. It should be noted that the percentages in Table 1 represent the items brought to a search by a user, and because one user often brought more than one item, the total percentage exceeds 100%.

TABLE 1

Types of Information Brought to a Search

	COMPLETE AUTHOR	PARTIAL AUTHOR	TOTAL AUTHOR	COMPLETE TITLE	PARTIAL TITLE	TOTAL TITLE	TOPIC WORDS	SUBJECT HEADINGS	TOTAL SUBJECTS
ARL	44.6%	14.1%	58.7%	40.5%	11.8%	52.3%	27.7%	41.5%	69.2%
PUBLIC	39.1%	9.9%	49.0%	38.5%	9.5%	48.0%	25.4%	48.4%	73.8%

Table 2 shows what information users of the individual ARL systems bring to their searches. As can be seen, the variations are somewhat greater than between the public and ARL libraries. 31.8% of Ohio State users bring author information as opposed to 28% of MELVYL users. There is a wider variation in those who bring title information, with 29.4% of Ohio State users bringing title information while 21.6% of MELVYL users bring titles. When comparing users bringing subject information there is a significant difference. 48.6% of MELVYL users bring subject information while only 33.3% of Ohio State users do. It seems clear that there are significant differences in what a user brings to a search based on what system is used, reflecting user expectations of each system--a function of prior experience. The method

of calculating percentages in this chart differs from that of Table 1 in that the percentages here are of total items brought rather than of total users. However, because the percentage of users who brought call numbers was not included, the total is somewhat less than 100%.

TABLE 2

Types of Information Brought to a Search

	COMPLETE AUTHOR	PARTIAL AUTHOR	TOTAL AUTHOR	COMPLETE TITLE	PARTIAL TITLE	TOTAL TITLE	TOPIC WORDS	SUBJECT HEADINGS	TOTAL SUBJECTS
MELVYL	20.7%	7.3%	28.0%	15.8%	5.8%	21.6%	19.9%	28.7%	48.6%
SYRACUSE	22.6%	7.6%	30.2%	21.0%	6.0%	27.0%	17.7%	21.6%	39.3%
OHIO ST.	25.1%	6.7%	31.8%	24.2%	5.2%	29.4%	11.3%	22.0%	33.3%

Table 3 compares the percentage of subject headings brought by MELVYL and Ohio State users based on the frequency of their use of the library. Of Ohio State users who come to the library four times a year, 59.2% bring subject headings whereas only 33% of daily users do. For MELVYL users there is a very different pattern. The proportion of MELVYL users who bring subject headings actually increases from 45.8% for four times a year users to 49.5% for daily users. This is a case where a significant difference exists in the way the two systems are used; again, a reflection of system capabilities.

TABLE 3

MELVYL and Ohio State Users Who Brought Subject Headings to a Search, by Frequency of Use of the Library

	DAILY	WEEKLY	MONTHLY	4 TIMES A YEAR
MELVYL	49.5%	52.9%	44.9%	45.8%
OHIO STATE	33.0%	42.0%	47.5%	59.2%

The fact that users with different subject backgrounds bring different information to a search is not surprising. Users in Education, Humanities, and Social Sciences tend to bring more author/title information and less subject information than do those in Business, Engineering and Science. Engineers, interestingly enough, bring less complete author and complete title information than any other group but bring more partial author and title information. This may indicate that engineers have discovered more quickly

than others that it is not necessary to bring a complete author or complete title to search an online catalog.

Examining what people bring to a search based on their academic status shows a rather clear pattern as illustrated in Table 4. A ranking technique is used to show the relative strengths of the elements within each row. Table 4 shows that 39.3% of all users bring complete author information. If there were no differences based on academic status one would find that the numbers in each of the categories within the complete author row were very close to 39.3%, but that is not the case. One finds that 51.9% of faculty bring complete authors, while only 34.9% of freshmen and sophomores do. This table shows that freshmen/sophomores and juniors/seniors rank relatively low in bringing author and title information but rank high in bringing topic words and subject headings, while doctoral students and faculty rank high in bringing author and title information and low in bringing topic words and subject headings.

TABLE 4

Types of Information Brought to a Search, by Academic Status

	FRESHMAN -SOPHOMORE 1	JUNIOR--SENIOR 2	GRADUATE -MASTERS LEV 3	GRADUATE -DOCTORAL LE 4	GRADUATE -PROFESSIONA 5	FACULTY 6	STAFF 7	OTHER STATUS 8	TOTAL
COMPLETE AUTHOR	8 34.9%	6 35.6%	5 40.4%	2 51.1%	7 36.2%	1 51.9%	3 44.3%	4 42.0%	39.3%
PART AUTHOR'S NAME	8 11.1%	7 14.2%	4 24.8%	1 30.3%	2 26.7%	5 23.1%	3 25.2%	6 16.9%	18.0%
COMPLETE TITLE	7 33.1%	5 34.1%	2 41.5%	1 43.8%	8 32.4%	4 35.9%	3 39.7%	6 33.2%	36.1%
PART TITLE	8 10.4%	7 12.4%	4 20.5%	2 22.7%	3 21.0%	6 17.3%	1 26.0%	5 18.1%	15.5%
TOPIC WORD OR WORDS	2 31.6%	3 31.2%	5 27.9%	7 16.7%	1 33.3%	8 15.4%	6 19.1%	4 29.2%	28.1%
SUBJECT HEADINGS	2 46.2%	1 46.9%	5 32.6%	7 25.7%	4 39.0%	8 20.5%	6 30.5%	3 45.2%	40.5%

Comparing the kind of information users of individual systems bring to their search based on their academic status shows a pattern of particular interest. Table 5 compares the percentage of users by academic status who bring subject headings to a search for the MELVYL and Ohio State systems. The freshmen/sophomore group for both systems is almost identical at about 52%, and the numbers remain relatively close for juniors/seniors, with MELVYL users at 50.7% and Ohio State users at 49.5%. The percentages for graduate masters students begin to show a difference, with Ohio State users dropping to 30.5% while MELVYL users drop to only 44.6%. The difference becomes greater with more advanced users. 42.9% of MELVYL faculty users bring subject headings

whereas only 10.5% of the Ohio State faculty users do. This represents a significant difference in the use of the two systems and their capabilities--MELVYL offering a more sophisticated subject search capability.

TABLE 5

MELVYL and Ohio State Users Who Brought Subject Headings to a Search, by Academic Status

	Freshmen Sophomore	Junior Senior	Graduate Masters	Graduate Doctoral	Graduate Professional	Faculty	Staff	Other
MELVYL	52.3%	50.7%	44.6%	46.2%	41.2%	42.9%	43.5%	53.2%
OHIO ST.	52.8%	49.5%	30.5%	23.5%	35.7%	10.5%	18.8%	32.7%

It was the intent of this study to look at what people actually use in searching compared to what they brought, but it turned out that the patterns were virtually identical. People did bring complete author and complete title information and used partial authors and partial titles in a number of cases, but the overall patterns remained unchanged. One question that should be considered is whether it is reasonable to expect people, after they have completed a search, to differentiate what they brought from what they used.

Information Sought and Found by Users

What are people trying to find when conducting a search in an online catalog? Table 6 shows what users of ARL and public libraries as well as users of the three individual ARL systems are trying to find. The percentage of users of public and ARL libraries looking for specific books and books on topics are relatively close, and the percentage of those looking for books by a particular author are almost identical. A comparison of the individual ARL library systems shows considerably more variation. MELVYL users are significantly less interested in looking for specific books than are users of the Syracuse or Ohio State systems. Looking at the percentage of users interested in books on a topic shows that 59.5% of MELVYL users want books on a topic while only 47.7% of Ohio State users do. It is somewhat interesting to note that the use of the MELVYL system for finding books on a topic is considerably higher than the public library group.

TABLE 6

What Users Were Trying to Find

	PUBLIC	ARL	MELVYL	SYRACUSE	OHIO STATE
SPECIFIC BOOK	49.4%	52.3%	36.4%	55.0%	57.2%
BOOK ON TOPIC	53.9%	51.0%	59.5%	53.5%	47.7%
BOOKS BY AUTHOR	23.5%	24.5%	24.6%	24.8%	22.6%

Why Users Need the Information Sought

Why do people need the information for which they are searching? Probably the answer to this question is more useful in understanding why people use research libraries than it is in helping to design online catalogs.

Table 7 shows why users need the information, comparing the ARL group to the public library group. The figures here are not surprising. The use of public libraries to identify information for recreation, fixing things, work, personal interests and hobbies is significantly higher than for the ARL group, while ARL users are significantly more interested in information to support class readings, reports, theses, and publications and teaching. Keeping up with topics is relatively even between users of ARL and public libraries, suggesting that this category was interpreted in a variety of ways.

TABLE 7

The Reason for Seeking Information

	RECREATION	FIXING	WORK	PERSONAL	HOBBY	CLASS	REPORT	THESIS	PUBLICATIONS	TEACHING	KEEPING-UP
ARL	12.6%	1.8%	14.8%	23.2%	6.0%	33.0%	45.1%	11.7%	7.5%	4.6%	13.4%
PUBLIC	31.1%	7.2%	17.0%	50.6%	13.6%	17.4%	21.1%	3.9%	3.3%	3.7%	15.1%

Table 8 compares why users of individual ARL systems need information, and here there are some rather interesting differences. Users of MELVYL are considerably more interested in non-course related reading than users of the Syracuse system, while use of the Syracuse system for class reading and class reports is significantly higher than either of the other two systems.

TABLE 8

The Reason for Seeking Information

	RECREATION	FIXING	WORK	PERSONAL	HOBBY	CLASS	REPORT	THESIS	PUBLICATIONS	TEACHING	KEEPING-UP
MELVYL	17.1%	2.3%	12.3%	27.9%	10.0%	28.4%	38.6%	11.2%	7.5%	4.5%	14.7%
SYRACUSE	8.7%	1.1%	17.2%	20.5%	3.4%	36.9%	54.8%	7.6%	5.8%	4.3%	12.0%
OHIO ST.	14.9%	2.3%	11.6%	24.6%	7.9%	34.4%	42.2%	12.0%	6.9%	5.1%	15.4%

Some general observations about the information needs of users of ARL libraries can be made. There is considerably more general and recreational use of research libraries than one might expect. Use of online catalogs to identify information on course reading is fairly even regardless of subject area; however, use for course papers varies by subject with higher use by those in Business, Social Sciences and Education and lower use by those in Medicine, Engineering and Science.

The Amount of Information Found in Using an Online Catalog

How much do people find when searching in online catalogs? Table 9 shows relatively little difference between users of public and ARL libraries. Those using public libraries do indicate that they find "more than" they wanted more frequently than do users of ARL libraries. A few more public library users also find "all" that they want, and there is a slightly higher incidence of ARL users finding "some" of what they want or "nothing." However, one is struck more by the similarities than by the differences.

TABLE 9

The Amount of Information Found When Using an Online Catalog

	MORE THAN	ALL	SOME	NOTHING
PUBLIC	19.7%	31.7%	34.1%	14.6%
ARL	14.8%	26.3%	40.2%	18.7%
MELVYL	11.8%	13.5%	43.2%	31.5%
SYRACUSE	14.7%	25.8%	40.6%	18.9%
OHIO ST.	19.5%	31.4%	37.3%	11.9%

A comparison of the three ARL systems shows considerably more variation. Only 11.8% of MELVYL users find "more than" they want, which might indicate superior precision over the other systems or the fact that the database was fixed and not growing at the time of the study. But the percentage of people finding "all" of what they want is only 13.5% for MELVYL users, whereas for Ohio State users it is 31.4%. An examination of the percentage of users who find "nothing" shows that 31.5% of MELVYL users find "nothing" as compared with 11.9% for Ohio State users and 18.9% for Syracuse users. Clearly the fact that the MELVYL database is a prototype had an impact on user response to this question.

A number of observations can be made about how much users find based on certain characteristics. Frequent users tend to find more than infrequent users. There is no consistent pattern when looking at what people find based on their subject background; however, some general observations can be made: those in Medicine tend to retrieve a great deal; those in Business and interdisciplinary subject areas are somewhat unsuccessful; and those in the Humanities fall in the middle of that range. The patterns produced by user responses in the other subject areas are contradictory, with very high retrieval rates for users of some systems and low rates for users of others. Looking at how much users find based on academic status shows that faculty and staff lead in finding "more than" or "all" of what they wanted but faculty also lead in finding "nothing."

User Satisfaction

Finally, it is interesting to compare what people find with how satisfied they are. Table 10 shows this comparison for the ARL group. It is somewhat surprising that whether people find "more than" they want or "all" that they want makes little difference in how satisfied they are. 81.3% of the people who find "more than" they want are very satisfied, while 82.7% of those who find "all" that they want are also very satisfied. It is also surprising that 6.9% of the people who find "nothing" are very satisfied and 12.9% of the people who find "nothing" are somewhat satisfied.

TABLE 10

The Amount of Information Found When Using an Online Catalog, by Level of Satisfaction

	MORE	ALL	SOME	NOTHING
VERY SATISFIED	81.3%	82.7%	20.8%	6.9%
SOMEWHAT SATISFIED	15.3%	15.8%	62.3%	12.9%
SOMEWHAT UNSATISFIED	2.3%	0.9%	14.6%	24.9%
VERY UNSATISFIED	0.9%	0.6%	2.3%	55.4%

An objective of this study was to look at user satisfaction and the users' overall reaction to the online catalog as compared with the card catalog, but users were so positive in their responses that little useful information could be obtained. Table 11 shows the users' view of the online catalog in terms of being better, the same or worse than the card catalog and compares that view with how satisfied they are. 85% of the users who are very satisfied think the online catalog is better. But 45.5% of the users who are very unsatisfied still think the online catalog is better than the card catalog and nearly 70% of those who are very unsatisfied think the online catalog is better than or the same as the card catalog. Clearly users believe that, regardless of its imperfections, the online catalog is as good as, or better than, the card catalog.

TABLE 11

The Online Catalog Compared to the Card Catalog,
by Level of Satisfaction

	BETTER	SAME	WORSE
VERY SATISFIED	85.0%	12.6%	2.4%
SOMEWHAT SATISFIED	75.0%	17.9%	7.1%
SOMEWHAT UNSATISFIED	55.2%	25.3%	19.5%
VERY UNSATISFIED	45.5%	24.4%	30.1%

Summary

What assumptions can be drawn from these data? First, users are adaptable. They will bring information to an online catalog that they believe will be useful in conducting a search. And as can be seen, a reasonably similar group (demographically) using three different systems bring significantly different information based presumably on different system capabilities and user expectations born out of previous experience with the systems.

Second, the quality, or more accurately the size and currency, of the database is extremely important to overall user satisfaction. Probably if there were a choice between more sophisticated systems or more complete databases, the results of this survey would argue for the more complete database. Users of the MELVYL system search in a more sophisticated manner than do users of the Ohio State system, but MELVYL users are clearly not as satisfied, presumably because of the inadequacy of the database.

Third, there is a need to look in more detail at subject searching using online catalogs. The fact that the more advanced users of the MELVYL system, the graduate students and faculty, use that system in a more subject-oriented way than do users of the other systems is significant. It may be that MELVYL users are searching for subjects because they are unable to find the specific items that they want in the database. It may be that they regard the system as a prototype and are using it to experiment rather than to actually do work. But it may also be that as systems improve in terms of subject searching, more and more advanced users will use subject searching capabilities. Future studies of subject searching should also monitor the use of the Ohio State system. In its early stages of development this system lacked subject access and therefore produced a group of users accustomed to having only author and title access. The expanded capability of the Ohio State system to provide subject access, combined with a user education program, may shift system use to a pattern more like that of MELVYL users. Whichever pattern evolves as the dominant one, it will have an impact on the design of online catalogs.

Finally, and possibly most important, it is clear that library users want online catalogs to succeed. It is difficult in many cases to get useful information because they are so positive. They want online catalogs to succeed, and they want to use them. Even if they are at times frustrated with these systems, they find the online catalog to be better than the card catalog.

APPENDIX D

SUMMARY OF THE RESEARCH LIBRARIES GROUP REPORT

(Summary, with minor editing, from: The Research Libraries Group, Inc. PUBLIC ONLINE CATALOGS AND RESEARCH LIBRARIES. Final Report to the Council on Library Resources. Stanford, CA. 94305. September 1982. 75 pp. plus appendices. Has been submitted to ERIC.)

Many public online computer users in the four samples studied by RLG are college undergraduate students aged 20-34 studying the humanities and social sciences who visit the library daily or weekly and who use both the computer and the manual catalog on most visits. They do not appear to make above-average use of computers elsewhere.

Patrons who become public online catalog users often learn of its availability by noticing a terminal in the library. By their own reports, they often learn to use it and to make searches without receiving any staff assistance, though staff observations do not support the respondents on this point.

Users' search objectives often are coursework-related and specific, and they bring with them and search by specific terms, especially complete author's name, complete title, and/or complete subject heading. However, users report subject search objectives in numbers almost as high as specific item search objectives. The percent of subject searching is far higher than reported in studies of manual catalogs. Overall, users like the public online catalog, in part presumably because about half of them typically find what they are looking for, and often find other items of interest as well.

Typical problems encountered and improvements desired by public online catalog users were as follows: Concerning databases, users are often uncertain exactly what databases cover, but they want broader coverage, especially more older books. Concerning software, increasing the result of a search is a common problem, while the improvements most wanted concern providing or extending subject access. Concerning terminals, the height of terminal tables and inadequate writing space are problems, while providing more terminals is the improvement most desired. Printout and circulation capabilities are also favored. Concerning library services, users mention the absence or inadequacy of signs and brochures in terminal areas.

Non-users of public online catalogs typically explain either that they have had no time to learn or have not felt a need to do so. Nevertheless, they say they are favorably disposed toward the public online catalog, and believe that it would be easy to learn; indeed, they expect to become users in the future. Like users, non-users visit the library and consult the manual catalog often. They also generally resemble users in age, academic focus, academic area, and education level.

Library staffs interviewed observed that users have more apprehensions about public online catalogs and request more assistance than the survey data may suggest. Staff feels many users experience substantial difficulty in learning to use the catalog. Exact compliance with entering terms, resuming a search, and beginning a new search are particular problems mentioned. On the other hand, staff perceives that the relative rigor required to use public online catalogs is slowly improving users' mastery of catalog concepts, terminology, features, and procedures generally. Materials in other libraries and items newly added to the collection also come to users' attention more often and sooner than before.

Library staffs express mixed feelings about the impacts of the public catalog on the library itself. On the one hand, they perceive that it enhances staff's "high tech image." The computer catalog also provides convenient, diffused access to the union catalog from every terminal. Terminal access permits prompter, more effective patron service in handling phone inquiries or in teaching while assisting patrons at service desks instead of merely giving general guidance, then dispatching patrons to the manual catalog. On the other hand, staffs are not certain to what extent they wish to be seen as "computer people" rather than "book people." They note, too, that general patron access to dispersed terminals results in patron service requests of all sorts to whichever staff member may be nearby. They also are apprehensive about their dependence on the computer: "I dread the Friday evening five years from now when I go to the online catalog and it's down, and they all have papers due on Monday." Public service staff members, the main point of patron contact, also desire to be involved earlier, more often, and more intensively in the design, implementation, and redesign of public online catalogs.

Some implications of these findings are: Patron acceptance of public online catalogs seems assured, although special efforts will be required to persuade some user groups. Making terminals highly visible and having enough of them to insure ready availability on the average greatly promotes user acceptance and use. If clear and complete signs, brochures and onscreen aids designed to promote self-directed learning and use are provided, patrons will appreciate and use them, thereby minimizing requests for staff assistance. Database scope, content, and range of priorities should be matched as nearly as possible to users' priorities, and inclusions and exclusions should be brought to users' attention early and often. Finally, given the many parties whose interests are at stake (patrons, technical and public services staffs, system designers and operators, managers and administrators), vigorous library management leadership and insistence on cooperative, effectively integrated efforts are essential for successful implemention of public online catalogs.

APPENDIX E

SUMMARY OF THE J. MATTHEWS AND ASSOCIATES REPORT

(Summary, with minor editing, from: J. Matthews and Associates, Inc. A STUDY OF SIX ONLINE PUBLIC ACCESS CATALOGS: A REVIEW OF FINDINGS. Final Report to the Council on Library Resources. Grass Valley, CA. 95945. November 1982. 127 pp. Has been submitted to ERIC.)

During 1981-1982 the Council on Library Resources (CLR) funded a set of cooperative projects to study public access online catalogs. The organizations participating in the CLR Online Public Access Catalog Study were: J. Matthews and Associates, Inc.; the Library of Congress; Online Computer Library Center, Inc. (OCLC); Research Libraries Group, Inc. (RLG); and the University of California, Office of the Assistant Vice-President for Library Plans and Policies. Rather than a summary of the data, this executive summary focuses on implications that logically follow from the analyzed data.

Six computer systems and seven libraries participated in the J. Matthews and Associates, Inc. (JMA) portion of the CLR Online Public Access Catalog Study. The seven participants were: Claremont Colleges Library which uses the Claremont Total Library System (developed by Claremont staff; a revised version of which will be marketed by OCLC); the Evanston Public Library which uses the CL Systems, Inc. LIBS 100 touch screen terminal public access catalog; The Minnesota State University online union catalog; Pikes Peak Regional Library, which uses their own in-house developed computer system called Maggie's Place; Stephen F. Austin University which uses a DataPhase System, Inc. turnkey circulation system as an online catalog; and the West Valley Joint Community College District whose two community college campuses--Mission College and West Valley College--share a Universal Library Systems (ULISYS) turnkey automated library. For purposes of this analysis, respondents from Mission and West Colleges have been grouped together.

The focus of this cooperative research project was the interface between the user of the online catalog terminal and the computer system which supports and responds to the user's request for information. Data was collected from two groups of individuals using self-administered questionnaires. The first group were users of the online public access catalog and the second were users of the library who were non-users of the online public access catalog. A total of 1,152 user and 1,315 non-user questionnaires were completed. The response rates (willingness to complete a questionnaire) for both the user and non-user groups averaged 46.5 percent and 62.2 percent, respectively.

One can describe the elements of the study as follows. An individual at the online catalog terminal, the user, uses the online catalog to answer one or more questions, the task. The user searches the computer catalog (the database) using a terminal linked to the computer system. The organizational

interface, typically within a library, includes terminals, furniture and lighting, staff assistance and printed aids for training and orientation of the user. The user-computer interface is the interactive communication between the catalog user and the computer system including commands, displays, messages, and technology to access the online catalog database through indexes stored in the computer system. The user computer interface has to be both a link with the required facilities to allow the user to accomplish a set of tasks at the computer catalog and a barrier protecting the user from exposure to confusing technical facets of the computer system.

A desirable objective for any online catalog is to create a user-computer interface that is "user-friendly" or "user-cordial." The purpose of such an interface is to make the interaction between the user and the computer system as easy and productive as possible.

The User of the Online Catalog

Based on data collected in this study, the typical user is a youngish, well-educated, adult male who goes to the library on a fairly regular basis. Familiarity with and prior use of computer technology is not a dominant characteristic of the computer catalog user. In academic libraries, users of the online catalog are most often doing course related work. Slightly over three-fourths of public library users are at the computer catalog for personal interest or recreational purposes.

In terms of age, the majority of non-users are slightly older than users (between the ages of 20-34). Non-users of the computer catalog report that the reasons for their non-use include: have not taken the training; no need to use any library catalog; and no time to learn to use the online catalog. One-fourth of the non-users reported that they did not know there was a computer catalog and 14 percent claimed they did not know where the online catalog was located.

Users of the computer catalog expect to do more subject searches than has been possible with card, book or COM catalogs. Users believe that they frequently bring complete information about a subject heading, title or author's name. Given that over half the users arrive at the online catalog with either a subject heading or topic word or words, the provision of term or keyword searching would appear to be a requirement for a "successful" online catalog.

Until a great deal more research is completed about users of interactive computer-based systems, and the problem-solving skills of most people, designers of online catalogs must recognize that there is a range of user capabilities and provide several ways or levels for using online catalogs easily.

Any online catalog marketing strategy should take advantage of the perceptions of non-users by emphasizing that: 1) little formal training is neccessary to learn to use the online catalog; 2) the time required to learn

basic skills is short; 3) the online catalog offers improved information retrieval capabilities; and 4) hopefully, the location of the computer catalog termials is convenient. Personal testimonials by influential students, faculty, and community leaders, while a little "hokey," will be effective too.

The Organizational Interface

Libraries with computer catalogs already have done a relatively good job of addressing the organizational interface issues. The majority of users simply observe the terminal in the library and learn to use the computer catalog by themselves using printed instructions provided by the library via brochures or signs or the instructions displayed on the terminal screen itself. And when users need help, they turn most frequently to printed materials or to the computer itself by typing "HELP."

These dependencies underscore the need for the library to provide clear instructions on how to use the computer catalog and how the user can learn to solve problems encountered during a search. Instructions are needed in printed form and also should be displayed on the terminal screen itself. The layout of instructional text on the screen, or the format, should be different than that used for printed instructions. In addition to brochures, a summary chart of commands affixed to the terminal is a feature frequently requested by users.

Though nearly one-fourth of the users learned to use the online catalog with the assistance of library staff, they turned less frequently to staff when they encountered problems. Libraries with online catalogs should devise coordinated instructional programs, perhaps including slide tape or video tape programs, to teach the effective use of the computer catalog. Libraries should pay attention to the character of support furniture for online catalog terminals. To date, terminals are typically placed on existing furniture with little thought for the needs of the user, e.g., privacy and comfort, or for the requirements of the terminal itself. Adequate writing space on both sides of the terminal is a principal requirement.

The Computer System

Terminals included in this study contributed few problems for users of the online catalog. Larger characters on the terminal screen will be more pleasing but users are generally satisfied with the current 7x9 dot matrix character size. Yet, substantial improvements can be made in the design of online catalog terminals. Special function keys could be color coded and precisely labeled, e.g., Author Search, Title Search, Subject Search, etc.

Computer size/power (i.e., mainframe or minicomputer) will clearly affect the features that can be made available to the user of the online catalog. Only Mankato State University, with its mainframe computer, was able to provide keyword or term searching, explicit Boolean searching and sorting of the search results for each display. However, mainframe computers imply

higher one-time and continuing costs for system acquisition and maintenance. Larger systems may also require a larger support staff. However, a mainframe computer may not be necessary to support keyword or Boolean searching if the database is of limited size, the number of terminals is small, and transaction volume is modest.

Regardless of the size of the computer system or its characteristics, two crucial issues are system reliability and response time. All of the systems in the CLR study experienced little or no downtime during the data collection period. More than one-fourth of the users, however, indicated a problem with response times.

Database issues are complex and involve a number of trade-offs. Should the database contain full MARC records? A full MARC record for all or some of the MARC formats, e.g., monographs, serials, maps, etc.? How many indexes to the database should be provided? Should Boolean search capabilities be provided or, if provided, should they be explicit or implicit? Should there be term or keyword access to author, title, subject headings, added entries, notes or series fields? Should a user be able to limit or restrict search results by date of publication, language, format of material, location, etc.? All of these issues and more must be faced by libraries considering an online catalog and by system designers.

The user of the online catalog would like the database to include all kinds of materials. Almost 4 out of 10 users indicate that they would like access to journal titles (they may have meant journal articles) and about one-forth of the users want access to films, newspapers, government publications and phonograph records and tapes.

The System Interface

The need for standards for purposes of consistency in the area of the display of information and use of codes or abbreviations on terminal screens is vital. For example, should bibliographic data elements be labeled? Where in the display should the call number be located? Should the call number be a multi-line display similar to what is found on the spine of the item? Should system messages and command options be presented at the top or bottom of the CRT screen? Should the previous command, used to generate the current display, be included in the current display?

Those involved in the standards setting process must remember that much of what worked with the 3x5 card technology will not work with CRT technology. As the number of computer catalogs proliferate and the number of different computer catalog systems multiply, this area requires more and more attention. The time for action is now. Fortunately, the work underway by an ANSI Z39 committee on commands is beginning to address this issue. The decisions about the display of bibliographic information on CRT terminal screens are rarely made with the user in mind. What data elements are needed? In what order do most patrons record or use information from a bibliographic

display? What do patrons call each data element? The current variations for displaying data on a CRT terminal screen are vast indeed.

Users of computer catalogs need improved user cordial ways of retaining control and managing the information that they retrieve. Improvements are needed with the interface itself; standards or guidelines are needed to encourage a consistent and meaningful command language; and users must be trained in the effective use of system capabilities.

Given the amount of subject searching being done by users of computer catalogs and the problems experienced with subject searching, this is an area that commands serious attention at two levels. First, what are the short-term solutions that might be implemented by designers of computer catalogs to improve subject searching? Possibilities include systems that systematically "capture" terms entered by users to build a list of aliases (SEE References) to aid the user in moving from words entered by the user to Library of Congress Subject Headings phrases. In addition, the Library of Congress might begin to assign more subject headings to each MARC record to improve the likelihood of a user finding valid subject headings. Second, what long-term steps might be taken by the library community to enhance subject searching in public access computer catalogs?

The ability to view and browse an authority control file is perhaps crucial to the long term success of an online catalog. The authority control file, including sufficient SEE and SEE ALSO cross references, can link terms used by users to the pre-coordinate subject heading systems usually employed by libraries.

Perhaps the only realistic solution to the shortcomings of the Library of Congress Subject Headings (LCSH) is to provide users of the computer catalog with term or keyword searching. Such a technique substantially increases the number of access points and thus the number of records retrieved by a system. The user of keyword searching need not be restricted to subject heading indexes, but can also be allowed to search author, title, notes, series, and other indexes. Additional techniques, such as the "keyword approximation search" used at the Washington University School of Medicine in St. Louis, Missouri, can be used to improve the likelihood of a user's success at the online catalog. Because improved searches are likely to result from an augmented MARC record, e.g., MARC plus the addition of the table of contents and/or index terms, serious attention should be given to the creation, distribution and use of augmented records for use in online catalogs.

Online Catalog Use and Satisfaction

Users of the online catalog do a lot of subject searching. This is particularly true at Mission/West Valley Colleges where the user is provided with a display of valid subject headings as a result of the subject search entered by the user. Subject searching is also high at Mankato State where the user has the opportunity to use term or keyword searching. Almost half of all searches entered by users at Mankato State are for term or keyword

searches. And there are more than twice as many term searches, which retrieve the entered term(s) from subject heading, title and author fields, than subject heading searches at Mankato State. It would thus seem that providing term or keyword searching and displaying (for browsing) valid subject headings should be a requirement for an online catalog. The capacity to select a particularly relevant document using a keyword search and then viewing all the records that have the same subject heading(s), through the use of an "Expand" command, would be another powerful tool for online catalog users.

Users of the online catalog indicate a high success rate in using the online catalog and are very positive about the online catalog for specific searches and are generally positive about the computer catalog. Users of the online catalog seldom go back to other formats of the catalog. Use of the catalog and use of the library's collection does seem to increase after an online catalog is installed.

The results of the CLR study suggest that an online catalog will be enthusiastically received by the users of the library. The challenge for library management is to select and implement an online catalog that will meet the diverse needs of all of its library users.

APPENDIX F

SUMMARY OF THE LIBRARY OF CONGRESS REPORT

(Summary, with minor editing, from: Anderson, Rosemary; Reich, Victoria A.; Wagner, Pamela Roper; Zich, Robert. LIBRARY OF CONGRESS ONLINE PUBLIC CATALOG USERS SURVEY. A report to the Council on Library Resources. Library of Congress, Office of Planning and Development. Washington, D.C. 20540. October 29, 1982. 17 pp. plus appendices. Has been submitted to ERIC.)

The Library of Congress (LC) participated in a national survey sponsored by the Council on Library Resources to study the current attitudes of users and non-users towards public online computer catalogs. We report here the results of the LC survey and compare this data with the national aggregate data. This report also identifies specific problems encountered by LC patrons in using the Library's online retrieval systems and recommends corrections for these problems.

Library of Congress users have free access to two online files. The Library of Congress Computerized Catalog (LCCC), the more heavily used file, allows searches of the MARC monographic database by author, title, LC subject heading, class number and card number. LCCC is accessed through the SCORPIO (Subject-Content-Oriented Retriever for Processing Information Online) retrieval system. The entire MARC file (books, serials, maps) may be accessed through the Library's MUMS (Multiple Use MARC System) retrieval system. MUMS allows component word (free text) searching of the author, title, note and tracing fields in the MARC records.

Because SCORPIO and MUMS have different sign-ons, file coverage, commands, subcommands, displays and sign-offs, the online catalog has caused some user confusion. To more clearly define the problem areas, the Library decided to survey online catalog users. Concurrently, the Council on Library Resources was orchestrating a nationwide multilibrary survey intended to reveal the present state of development of online catalogs and to further cooperation among those who have developed or are developing online catalogs. The Library of Congress joined this effort in early 1981.

With the aid of the Research Libraries Group, LC staff conducted a preliminary survey of patrons, and interviewed users and non-users alike. In the fall of 1981, the survey pre-test was administered, and the results were sent to the University of California, Division of Library Automation (UC,DLA) for analysis. The questionnaires were then revised into their final form, and a final sampling plan was prepared. In April and May of 1982, LC staff approached every appropriate patron and received completed questionnaires from 557 users and 300 non-users, which were sent to UC,DLA for analysis. Also in May, a series of focus group interviews were conducted by OCLC staff at the Library. Final results from the study arrived in early September.

The data show that the great majority (95%) of LC users of the online catalog think that the computer catalog is as good as or better than the card catalog. Most non-users also respond favorably to the system. A comparison of the responses of users and non-users at LC with those of the aggregate users and non-users surveyed reveals that LC patrons in general appear to rely more on the catalog--both online and card--than the aggregate patrons. Online searching is more frequently done by subject (68%), followed by specific title (38%) and specific author (21%) searches. LC patrons experience some problems using the system, such as difficulty remembering what the computer catalog includes, the necessity of "relearning" the system when used irregularly, and difficulty finding the "correct" subject terms for successful bibliographic retrieval. LC users express the desire for wider bibliographic coverage (dissertations, 44%; articles from journals, 43%; older books, 39%; newspapers, 37%), book location information, and some sort of online instruction such as system tutorials or "suggestive prompting."

The Library of Congress Planning Office is making the following general recommendations for the improvement of the online catalog: continued development of the HELP facility; loading of revised error messages into the system; continued work on unifying the commands of Congressional Research Service's PLATO-based tutorial system for public use; development and incorporation of an online system of "suggestive prompts"; incorporation of records for older materials and periodicals into the online catalog; and inclusion of location information in the bibliographic record.

The Planning Office also recommends that LC and the library community work together to alleviate some of the difficulties of subject searching by: placing subject authorities online and including in the authorities extensive scope notes; loading Dewey and LC Classification Schedules and, if feasible, enriching the subject record by including in the record a table of contents, indexes, and abstracts.

Several projects have been completed which help remedy problems identified by the survey. These changes and those that flow from implementation of the recommendations of this report should significantly aid the Library of Congress in providing the flexible, state-of-the-art bibliographic retrieval system for which it strives.

APPENDIX G

SUMMARY OF VOLUME 1 OF THE OCLC REPORT

(Summary, with minor editing, from: Tolle, John E. CURRENT UTILIZATION OF ONLINE CATALOGS: TRANSACTION LOG ANALYSIS. Volume 1, final report to the Council on Library Resources. OCLC Office of Research. Report number OCLC/OPR/RR-83/2. Dublin, Ohio 43017. March 31, 1983. 123 pp. Has been submitted to ERIC.)

A. Objective and goals

Part I of this study is concerned with the analysis of the transaction log records of online catalogs. The objective of this part of the online public access catalog study was to discover the extent to which current online catalog features are used and the patterns of that use. While examining the actual catalog use, at least two goals became obvious: to obtain a better understanding of the use of online catalogs and to refine the methodologies used in carrying out any transaction analysis study.

The first goal, to obtain a better understanding of the actual online catalog use, may seem to be too large or vague, as the objective is contained within it. However, it is important to keep in mind that a valuable asset of the research is that it generates questions that were not previously considered. As such, it contributes to an understanding of the catalog use. This study has achieved this in the sense that considerable understanding of catalog use has been obtained. There is of course more to do and investigate, but we are much closer to understanding how the online catalog is used.

The second goal, to refine the methodologies, was certainly achieved. The use of transaction analysis--via development of transition probability matrices, state definitions, state diagrams, and Markov analysis--to create chains of user patterns certainly offers promise. This transaction analysis methodology is still in the early stages of refinement, however. Further refinement will occur as more systems are examined and more data is analyzed.

The scope of the transaction analysis included collecting data from four different online catalog systems. Machine-readable log tapes, which contained the user transactions in various formats and codes, were received from the following institutions: Library of Congress, Syracuse University, Dallas Public Library, and The Ohio State University. In addition, data was collected on the searching of 76 OCLC public terminals at 53 different libraries (as defined by unique OCLC location symbols). By institution type, these 53 libraries included 5 public libraries, 5 federal or state libraries, and 43 academic libraries (including several medical, health, and law libraries).

B. Data Collection

For the other online catalog systems, we obtained transaction log tapes covering the following periods:

Library of Congress - March to June 1982
Syracuse University - April 12 to April 21, 1982
Dallas Public Library - August 9 to August 21, 1982
The Ohio State University - January to December 1981, April to June 1982

Originally we requested two months of data from each library, but the actual data received ranged from two weeks to one full year. For Syracuse University and Dallas Public Library, data was collected for two weeks, and included an examination of the representativeness of subsets of data. For Syracuse, some of the days were eliminated due to some mislabeled tapes and time consideration. For the Library of Congress, public user data was analyzed for the months of March 1982 and June 1982. April 1982 contained staff use data, and May 1982 had a mixture of both staff and public use data. These months were not analyzed, since we were interested solely in patron usage. Spring quarter 1981 was used for transaction analysis at The Ohio State University because session boundaries were defined by observers stationed at the catalog.

Each online catalog system was different; therefore, the resulting transaction log tapes varied in content and format. These differences are quite extensive, and the data reduction, coding, and reformatting represented a major task within the project. It was estimated, after the fact, that in conducting any transaction log analysis, well over 50 percent of the effort in labor and computer time (including programming, tape reduction, and reformatting) can be attributed to this phase.

Specific data elements collected (where available) included the following: terminal identification, user commands and codes, system commands and codes, the search key, session beginning, session ending, times of user and system responses, search text, and dates.

The above list represents an ideal rather than the reality, since no online public access catalog (OPAC) system studied had all of these elements as part of the information captured on the system logs and copied to tapes for analysis. In order to appreciate the differences among the systems studied, consider that Ohio State, Syracuse, and Dallas Public did not have any session determinates, i.e., session length (when a user begins a session and then ends the session) was not captured on their system.

The available data included manually collected start time at Ohio State, partial start time at Dallas, and start and end indications at LC. However, even though LC had "theoretical" session boundary markers, there were no time stamps on the data for time of day, nor were there any stamps indicating the date.

For Dallas, time was recorded to the nearest minute, which is insufficiently detailed for transaction analysis because patrons enter commands more often than once per minute. At Syracuse, an attempt was made to capture session beginnings by requesting certain user input, but this was often disregarded. The use of the Ohio State data from 1981 allowed session determination by coordination with observers who recorded the beginning of sessions. Since this was the only direct observation data, it was thought to be advantageous to make additional use of it even though it was originally collected for another study.

Syracuse had no user codes that were pre-coded. We obtained the literal use codes from the screen and had to search through the tapes until we came across the codes. System messages were also extracted in this manner.

C. Methodology

The task of analyzing the transaction tapes was broken down into the following steps:

1. Obtain the transaction tapes.
2. Check the data for validity and format; then copy them.
3. Condense the tapes by eliminating any data unnecessary to the analysis.
4. Determine sessions where possible.
5. Conduct analyses of nontransitional type (i.e., determine time and/or commands per session, etc.).
6. Build state maps using all codes.
7. Run analysis, check for problems, and condense the mapping further if required.
8. Build special maps and subsets of data.
9. Run analysis again.
10. Examine results for observations and conclusions.

The particular methodology chosen for analysis consists of first defining state codes and then developing taxonomies of these state activity codes (both user and system codes) that are mutually exclusive and exhaustive. Next, state mappings are determined that allow these state codes to be mapped into user or system states. User and system transactions are mapped into activity states. This mapping depends upon the user or system code assigned (if there is one) and also upon the context of use. The state codes represent search phases that the user is in at a given time. These were grouped according to function into one of eleven primary states, such as states representing the beginning of a session, display of bibliographic records, set creation (simple searches), help functions, combined functions, and errors that may occur.

Numerous mappings are possible for the same OPAC system. There is no one "correct" mapping; however, there may be "incorrect" mappings. For each system, a number of different mappings were made and analysis performed. At times, the output indicated the need for modifications in the selected maps.

In these instances, changes were incorporated. As such, the primary mapping serves as a structure that may be applicable in varying degrees to different online catalogs.

An individual taxonomy was often further refined in a more detailed taxonomy. For example, specific display commands could be broken down into display-author, display-title, and display-subject. It is possible to break out specific error types if such error types are defined by the system under study. Similarly, certain paging commands may be associated with some specific states, but not others.

When assigning commands to specific states, the context of the search should be considered. That is, we should consider the purpose or context of its actual use. A given command may have more than one use in practice. Therefore, its intended use should be considered, in addition to the semantics of the situation, before mapping the code to a state. It may thus be possible to map a command code to more than one state, depending on the context of its use.

An example of this is shown below, using search terminology from the Library of Congress system. (LCCC=Library of Congress Computerized Catalog.) The third column illustrates the state mapping that would occur for an "original" map, while the right column illustrates where the code would be mapped for a "context validated" map. BGNS represents a begin session code, BRWS represents a browse code, and DISP represents a display state, while ENDS represents an end session state.

Here, the paging commands were originally mapped into a display state, since they resulted in a new screen display. But, when considering the actual context of paging command use, they were being used as a browsing command (a specific bibliographic record was not being looked for in this example). Thus, these commands were mapped to a browse state (BRWS or BRW+, which means browse with explicit paging).

SEARCH CODE	SEARCH	STATE	
		Original Map	Context-Validated Maps
BGNS	LCCC	BGNS	BGNS
BRWS	PSYCHOTHERAPY	BRWS	BRWS
⊌	paging command	DISP	BRW+ or BRWS
⊌	paging command	DISP	BRW+ or BRWS
⊌	paging command	DISP	BRW+ or BRWS
ENDS		ENDS	ENDS

Once these state codes and mappings were determined, transition probability matrices and state diagrams were calculated and constructed. State transition matrices simply represent in matrix form the probability (or percentage) of going from an origin state to a destination state (e.g., the probability of starting in a display state and ending in an error state or

starting in an error state and ending in a help state). The state diagrams then illustrate the frequencies (percentage) of starting in a given state and ending up in another state.

Such matrices and diagrams can be calculated for 1st, 2nd, 3rd, and higher orders, where orders are defined as the number of transitions out of the origin state. That is, a transition from display to display is 1st order, while a subject to subject to author transition is 2nd order.

D. Observations and Conclusions

In attempting to draw conclusions and observations from the transaction analysis data, a number of questions were proposed and then addressed with regard to specific systems. A number of the original questions could not be answered because of the nature of the available data (e.g., time stamp not available on given systems) and data collection period. Observations and conclusions include:

The amount of time spent at the terminals was not available with any accuracy except at The Ohio State University, where it ranged from an average of approximately 4 minutes to over 9 minutes, depending on the library considered, i.e., Engineering, Undergraduate, West Campus, Education or Main Library. In all cases, the time spent at terminals was higher than the time spent at card catalogs (if available) at the same institution.

Errors frequently occurred in sequence, i.e., when an error was made, there was a high tendency to make another error (.286 at Syracuse, .598 at LC, .333 at OSU). At Dallas Public, few errors were made, a situation we attribute to the format filled system, which allows for few syntactic errors.

A number of questions are raised by the tendency to remain in an error state, including: Would help commands be useful? Are available help commands useful?

The data indicate that, for at least three of the systems (Library of Congress, Dallas, and the Ohio State University), we are dealing with fairly homogeneous data. We cannot say with any certainty that we have a random sample, especially at Syracuse, Dallas Public, and Library of Congress. No significant difference was found in the 0th order probabilities for The Ohio State University when using spring quarter data. Similarly, the March and June data from LC were comparable, as were the 1st and 2nd week of the Dallas Public data.

These comparisons were done on simple frequencies of command usage. It is not possible to compare state chaining patterns of higher orders with any degree of confidence. We are dealing with complex chains and behaviors that are dependent on numerous, undefined variables. Indeed, even with regression analysis techniques that are well defined, it is important to note that results are very dependent on the observed data sets. Another factor is

that random samples were not obtained. The systems are not designed to provide all the required data or to select random samples for analysis. Random samples would be necessary for strict sampling validity.

For LC, Syracuse, and Ohio State, the transitions of 1st and 2nd order between identical states have high probability, usually the 1st or 2nd highest probability in the transition matrices. This would seem to imply that users have a tendency to stay or return to the same state up to a chain of three commands. In addition, a detailed analysis of 2nd orders tends to confirm that they remain in the same state throughout the chain.

Search states have a tendency to go to the same states. For example, an author search tends to proceed to another author search, a subject search tends to proceed to another subject search, etc. Users seem to remain in the same search state for a long time. As previously mentioned, this also occurs for the error state.

A look at the most frequently used search types by title, author, subject, etc., yields the following:

	OSU(%) Spring 1981	DALLAS(%) April 1982	SYRACUSE(%) April 1982	
Title	30.8	16.0	20.7	
Subject	24.6	60.0	26.2	
Author	16.8	15.0	24.0	
Author/title	10.5	3.6	3.7	(BOOLEAN)
Other	17.3	5.4	25.4	

Subject searches are highest at Dallas and Syracuse, but at Syracuse, where the subject search is the highest percentage search, more sessions begin with an author search than with a subject search (25.1% compared to 21.9%). This "enhanced" number of subject searches may be attributable to users who use the search often within a session and may not be an indication of the type of search chosen. In addition, subject searches result in zero hits more than other searches, with the exception of a DUAL search (Boolean) at Syracuse. This indicates that subject searches are not a particularly successful type of search.

E. Transaction Analysis Goals

In summary, transaction log analysis is an effective tool for both formulating the questions concerning the actual user behavior at online catalogs and in answering these questions. There are a number of goals in studying this behavior, including the determination of how users perceive the system, how the system fits the users' needs, and how the system is really

being used. This third goal most obviously lends itself to transaction log analysis. The users' perception of the system and how it fits their needs helps to dictate how the system is actually used.

In order to approach a transaction analysis, it is first necessary to consider the system at a "lower" zero level. Next considered are first order descriptions, very simple user behaviors and system responses (e.g., whether the user hits a certain key or another key, and whether the system responds with a certain message or another message). At this point, we start collapsing strings of units that are coupled with a high probability into more comprehensive behavior descriptions. For example, one could collapse all repeated search strings together, such as author-author-author or repeated error strings. Or, one could collapse into a specific search command state with hits and another search command without hits. At this stage, the analysis is rerun (i.e., recalibrated) with new coding/state mappings, and other highly coupled states are sought.

Another use of the method of transaction analysis is to test hypotheses concerning user behavior at online catalogs, e.g., to test the hypothesis that a user tends to stay within the same search--author, subject, or title--within the same session. Other hypotheses may look at error occurrences and search frequencies.

Transaction log analysis may also be utilized to conduct basic exploratory data efforts and to generate questions that we may or may not be aware of. An example of this is the finding that the highest frequency of a search type is author search, while subject search is 2nd highest (this is only an example). Examination of the data may reveal, however, that within sessions multiple use of the author search is used much more frequently. Thus, when examining the frequencies of sessions that have specific search types, subject search may be highest.

This first online access catalog transaction log analysis study has helped to refine the goals of transaction analysis. It has also revealed some of the problems associated with conducting such a study which should be beneficial to future efforts. It has increased our knowledge of how these systems are actually being used and provides data and results with which to formulate questions and conclusions on the operation of OPAC's. As such, it offers an opportunity to build upon these efforts. Transaction log analysis offers an opportunity to expand our knowledge of the actual use of OPAC systems.

APPENDIX H

SUMMARY OF VOLUME 2 OF THE OCLC REPORT

(Summary, with minor editing, from: Markey, Karen. ONLINE CATALOG USE: RESULTS OF SURVEYS AND FOCUS GROUP INTERVIEWS IN SEVERAL LIBRARIES. Volume 2, final report to the Council on Library Resources. OCLC Office of Research. Report number OCLC/OPR/RR-83/3. Dublin, Ohio 43017. March 31, 1983. 184 pp. plus appendices. Has been submitted to ERIC.)

A. Project Objective

This report covers the analysis of questionnaires and focus group interviews at several libraries using online public access catalogs. The objective of the research project was to evaluate online public access catalogs (OPACs) through an analysis of patrons' needs and perceptions. The evaluation of existing OPACs is necessary to ensure that present and future development of such catalogs will lead to greater acceptance by library patrons.

B. Methodology

Self-administered questionnaires for users and non-users of OPACs were constructed by a committee composed of the principals whose studies of OPACs were sponsored by the Council on Library Resources. The survey instruments were pretested formally and informally prior to the actual study. In spring 1982, 29 institutions took part in the administration of user and non-user questionnaires. OCLC was responsible for questionnaire administration at the following 10 institutions:

1. University of Akron
2. Case Western Reserve University
3. Dallas Public Library
4. Iowa City Public Library
5. The Ohio State University
6. Ohio University
7. State Library of Ohio
8. Syracuse University
9. University of Texas at Austin
10. University of Texas at Dallas

The user questionnaire contained 59 questions, which were organized into the following four parts and subject areas: (1) most recent OPAC search; (2) experiences with OPAC features and services; (3) improvements to the OPAC; and (4) demographic information about the OPAC user. This questionnaire was distributed to "users" of OPACs who were defined as individuals 14 years old

or older observed using the OPAC, i.e., sitting or standing in front of a terminal and touching keys or the screen, looking at a display device, etc.

The non-user questionnaire contained 15 questions, which were organized into the following parts: (1) expectations of the OPAC; and (2) demographic information about the OPAC non-user. This questionnaire was distributed to "non-users" of OPACs who were defined as individuals 14 years old or over who responded negatively to the data collector's question asking whether they had ever used the library system's OPAC.

The time blocks when users and non-users were recruited to complete a questionnaire were randomly selected. The sampling plan was not the same from library to library but took into account each institution's calendar, hours, and special events. Data collection at Case Western Reserve University did not take place until fall 1982 and winter 1983. At eight of nine surveyed libraries, the acceptance rate of users exceeded 60%. The acceptance rate of non-users equaled or exceeded 65% at all nine surveyed libraries.

Focus group interviews were used to collect information on library staff and patron needs and perceptions of online catalogs. Four groups of participants were sought for focus group interviews: (1) library patron users of OPACs; (2) library patron non-users of OPACs; (3) reference services library staff; and (4) technical services library staff. Focus group interviews were conducted at the following six institutions:

1. Dallas Public Library
2. Iowa City Public Library
3. Library of Congress
4. Mankato State University
5. The Ohio State University
6. Syracuse University

The analysis of questionnaire data was performed at the University of California, Division of Library Automation (UC,DLA) using the Statistical Package for the Social Sciences (SPSS) to produce descriptive and nonparametric statistics. Content analysis of discussions in focus group interviews was used to construct a descriptive framework in which participants' remarks were categorized into four general areas: (1) existing system; (2) card to computer catalog transition; (3) database; and (4) user assistance. Comments of interview participants were used in this report to provide insight into and assistance in interpreting quantitative questionnaire results. Focus group interviews were also an important source of comments from groups of OPAC users and non-users who were not surveyed because they did not match the definition of a user or a non-user, and from members of relatively small but vocal groups, e.g., university faculty, older adults, etc., whose survey responses were overshadowed because they were represented in the population in relatively small groups in comparison to the majority of respondents.

C. Demographic Background of Surveyed Users and Non-users

1. Frequency of Library Visits by Library Patrons

   - Differences in frequency of library visits were found between library patrons and the types of libraries they visited and between OPAC users and non-users. Library patrons at public libraries and federal and state libraries visited the library less often than patrons at academic libraries.

   - Library patrons at Syracuse, Ohio State, and OCLC-system libraries (i.e., University of Akron, Ohio University, State Library of Ohio, University of Texas at Austin, and University of Texas at Dallas) visited the library on a daily or weekly basis. Library patrons at the public libraries of Iowa City and Dallas visited the library on a weekly or monthly basis. OPAC non-users at these five surveyed sites visited the library less frequently than users.

2. Frequency of OPAC Use

   - Differences in frequency of OPAC use were found between patrons and the types of libraries they visited. Library patrons at ARL-member, academic, and community college libraries used the OPAC less frequently than public library patrons. A large percentage of first-time OPAC users were found at federal and state libraries.

   - Library patrons at the public libraries of Dallas and Iowa City used the OPAC on every or almost every library visit. Patrons at Syracuse and Ohio State used the OPAC on almost every library visit or occasionally. OCLC users consulted the system less frequently than OPAC users at the four other surveyed libraries. Most likely, OCLC users consulted the system only when they could not find an item in the library's local catalog.

3. Age of Surveyed Respondents

   - Differences in ages of surveyed respondents were found between library patrons and the types of libraries in which they were surveyed. Most surveyed users and non-users represented the 15 to 19, 20 to 24, and 25 to 34 age groups.

   - The ages of OPAC users and non-users were in similar proportions in each age group, except for the high percentage of older adult public library non-users (15%) in comparison to the corresponding low percentage of older adult public library users (4%), and the high percentage of young adult public library users (27%) in comparison to the corresponding low percentage of young adult public library non-users (12%). Older adults in focus group interviews brought to light

their intimidation by the OPAC and their perception of youngsters' flexibility, eagerness, and receptivity toward the OPAC.

4. Sex and OPAC Use/Non-use

- With respect to the CLR-aggregate data (i.e., data collected at the 29 participating libraries), a significant relationship was found between sex and OPAC use/non-use. In general, a greater percentage of users was male.

- With respect to the five OCLC-surveyed sites, a significant relationship was found between sex and OPAC use/non-use at only Dallas Public Library. Statistics from Syracuse, Ohio State, Dallas Public, and OCLC-system libraries indicated that there were more female than male first-time users. Should such a trend toward female first-time use continue, percentages of male and female users might equalize in the near future.

5. Academic Background of Survey Respondents

- Percentages for the highest grade completed by survey respondents showed little difference between users and non-users at individual libraries or types of libraries. The majority of academic library patrons were in college; public library and federal and state library patrons were college graduates.

- With respect to the five OCLC-surveyed sites, the highest grade completed by survey respondents reflected findings in the aggregate grouping by type of library. The majority of library patrons at the academic libraries of Syracuse and Ohio State were undergraduates. At the public libraries of Dallas and Iowa City, the largest proportion of library patrons were college graduates.

D. Searching the Online Public Access Catalog

1. Purpose of OPAC Searches

- Differences were found in the analysis of aggregate data between the purposes of users' OPAC searches and the type of library at which they had performed their searches. At ARL-member, academic, and community college libraries, OPAC users' purposes were class-related. Personal interest was the chief purpose of public library searchers. OPAC users at federal and state libraries searched the OPAC for a variety of purposes.

- Individual libraries' statistics on OPAC users' search purposes reflected findings of the aggregate data except the purposes of OCLC-system users of which a large percentage was advanced research.

- The majority of Syracuse, Ohio State, and OCLC-system users who were undergraduates were involved in searches for class-related purposes. A large percentage of graduate student users of the Syracuse and Ohio State OPACs were also performing searches for class-related purposes. Faculty members' search purposes were related to their jobs or research.

- The main focus of OPAC users' academic work was course work, except at OCLC-system libraries, where both research and course work were the main foci.

2. Type of Information Entered into the Computer Catalog

   - Multiple responses to questions about the type of information users brought to and entered into the computer catalog and the type of materials they were trying to find confounded the results. Rather than risking erroneous interpretations from such confounded data, two methods are recommended for collecting more reliable data in future studies: (1) online questionnaire administration after the completion of an OPAC search that can be captured in a transaction log; and (2) "offline" questionnaire administration after OPAC searchers' expressed thoughts are captured through protocol analysis.

3. Finding the Object of the OPAC Search

   - Fewer than 20% of OPAC searchers did not find any of the desired material. The majority of OPAC users found at least "some" of the items for which they were looking.

   - More very infrequent and first-time users found nothing as a result of their search than frequent OPAC users. This finding: (1) suggests that lack of proficiency in the use of OPACs may adversely affect retrievals; (2) supports the requirement that OPACs should contain features that contribute to the ease of relearning the system; and (3) suggests that OPACs contain features that assist online searchers with alternate search strategies when their searches retrieve nothing.

   - In general, one of every two OPAC searchers encountered other things of interest in the course of their online search. Finding other things of interest was related to personal interest searches, a purpose characteristic of public library OPAC searchers.

4. Use of the Library's Traditional Catalog

   - Use of the library's traditional catalog by library patrons was connected to: (1) the capability of the online system, e.g., union catalog, local library catalog, etc.; (2) the purpose of the patron's

search; (3) the comprehensiveness of the online system's coverage with respect to the traditional catalog's coverage; and (4) combinations thereof. Should any of the first three factors change, library patrons' use of the traditional catalog would probably be affected.

E. Transition from Traditional Library Catalogs to OPACS

1. General Attitudes toward OPACs

   - Over 80% of surveyed users and non-users had favorable attitudes toward the OPAC. Non-users were less exuberant than users in their expression of favorability. Comparable but different studies of OPACs also reported favorable responses by users and/or non-users about OPACs.

   - At this early stage in the development of computer catalogs, few users have had the opportunity to use more than one OPAC. Only about 25% of surveyed library patrons were frequent users of other systems. Favorable attitudes of library patrons might change in time as they have more familiarity and practice with other OPACs and computer systems and have greater powers of discrimination.

2. Favorable Attitudes toward the OPAC

   - The four following reasons for favorable attitudes toward the OPAC were expressed in focus group interviews:

     a. Searching the computer catalog is fun. Especially among youngsters, young adults, and university students, searching OPAC was more fun and less boring than searching the traditional library catalog.

     b. Searching the OPAC saves time. The computer catalog saves time in a number of ways: (1) ability to view the same information that another searcher is viewing; (2) instantaneous response of the OPAC in comparison to flipping catalog cards; (3) ability to remain in one place and search many different access points; (4) ability to access the library's catalog from remote locations, e.g., campus terminals, home terminals, etc.; (5) availability of circulation information.

     c. The OPAC provides new services. Examples of these new services are printouts of retrieved citations, ability to search the catalogs of other branch or campus libraries, and mail delivery of books to home or office.

     d. The OPAC provides new features. Examples of these new features are author/title search, limit command, and component word searching of subject-rich MARC fields.

- The three following variables were related to OPAC users' attitudes in analysis of survey questions:

  a. Finding other things of interest during the OPAC search was related to OPAC users' general attitudes toward the OPAC. For example, the percentage of users who did not find other things of interest and were unfavorable toward the OPAC was over three times greater than the percentage of users who were unfavorable toward the OPAC and did find other things of interest.

  b. Users' attitudes toward the library's other catalogs were related to their general attitudes toward the OPAC. For example, OPAC users who felt that the OPAC was worse than the library's traditional catalog were also unfavorable toward the OPAC.

  c. Frequency of OPAC use was related to users' general attitudes toward the OPAC. For example, only 6% of frequent users were unfavorable toward the OPAC, whereas 21% of infrequent users were unfavorable.

3. Unfavorable Attitudes toward the OPAC

- The three primary reasons why surveyed non-users had not yet used the OPAC were: (1) not having taken training sessions on how to use it; (2) not having time to learn how to use it; and (3) no need to use any library catalog. Two reasons for non-use that emerged in focus group interviews (i.e., "card catalog is easier to use" and "dislike of computers") were not highly ranked among surveyed non-users but were reasons selected by non-users who were very unlikely to use the OPAC in the future.

- The five following reasons for unfavorable attitudes toward the OPAC were expressed in focus group interviews:

  a. Library patrons were familiar with and trusted the traditional library catalog. Library staff could help build patrons' trust in the OPAC by making clear to patrons: (1) why the library has chosen to convert to the OPAC; (2) comparison of the traditional catalog's contents with the computer catalog's contents; (3) types of assistance available for learning how to use the OPAC; and (4) benefits of the OPAC. Such information is important to disseminate before and after the introduction of the OPAC.

  b. Library patrons feared computers or mechanical devices in general. Their fear may dissipate as the use of computers in everyday living becomes commonplace. In the meantime, a variety of online and offline user aids is suggested.

c. Library patrons were reluctant to learn how to use the OPAC. Some of these patrons were merely "burned out" on learning, such as university students who viewed the OPAC as just one more aspect of university life that had to be learned and mastered. Other patrons, especially older adults and faculty members, were embarrassed about their lack of knowledge, which intensified when they compared their skills with those of youngsters or undergraduates. "Burned out" patrons will probably learn how to use the OPAC at the last minute before an assignment's deadline; consequently, workshops or individualized instruction must always be available, not just at fall orientation or in the first few months of the OPAC's residence in the library. Self-conscious or embarrassed patrons will probably have to be approached on an individual basis by library staff. Peer teaching by fellow faculty members was also suggested as a means of assisting reluctant faculty members.

- Statistical relationships were fourd between non-users' attitudes toward the computer catalog and: (1) perceived length of time needed to learn to use the OPAC; (2) perceived difficulty of learning to use the OPAC; and (3) likelihood of future OPAC use.

4. Satisfaction with the Most Recent OPAC Search

- Over 75% of users overall and at individual libraries were satisfied with the results of their most recent OPAC search.

- Searchers who discovered other things of interest during their most recent search expressed greater degrees of satisfaction than those who had not discovered other things of interest.

- Satisfaction with the most recent OPAC search was related to OPAC users' comparisons of the OPAC with the library's other catalogs. OPAC users who were not satisfied with their search generally felt that the OPAC was worse than the library's other catalogs.

5. Changes in OPAC Users' Search Habits

- The introduction of the OPAC to the library resulted in the following changes to the search habits of OPAC users, which were voiced by library patrons and staff in focus group interviews:

  a. Library patrons enjoyed searching the computer catalog more than the traditional library catalog.

  b. Library patrons took advantage of new features and services of OPACs.

c. Library patrons noted that the ability to remain in one place and check multiple access points increased their perseverance.

- Library patrons who noted that their search habits had not changed were performing bookshelf browsing searches in the computer catalog.

F. Features of Online Public Access Catalogs

1. Review of Features in OPACs

- OPAC features' were reviewed in system-by-system checklists for operational control, search formulation control, output control, and user assistance.

- When checklists of OPAC features were matched with the user questionnaire, it was demonstrated that: (1) there were features enumerated in the checklists that none of the systems in the study offered; (2) there were features in the systems studied that were not evaluated because the questionnaire did not contain questions about those features; (3) there was not a one-to-one correspondence between survey questions and OPAC features enumerated in checklists; and (4) survey questions about users' experiences with features were closed-ended.

- Focus group interviews provided a rich source for learning the nature of users' problems with OPAC features, helping to interpret survey results with regard to system features in general and disclosing users' problems with OPAC features that were not tested by the questionnaire.

2. Users' Favorable Experiences With OPAC Features

- Search formulation control features

a. Users' reported favorable experiences in connection with access points for known-item searching. The entry and amount of known-item information differed widely from system to system; however, subject access points were not listed among features with which users had favorable experiences, even though entry techniques were similar to known-item entry techniques. Thus, OPAC users' favorable experiences about known-item access points might be attributed to the concreteness of the task of finding known-items in comparison to the increased amount of mental effort involved in the task of subject searching.

b. Focus group participants noted that the virtue of the author/title access point was its ability to pinpoint the needed item with a minimum of screen manipulations.

c. Ohio State OPAC users cited the helpfulness of the shelf position search (SPS) to complete subject searches and/or browse the shelflist.

- Output Control Features

a. Bibliographic and circulation record displays of the five systems studied in the survey were featured in a discussion of the ease of understanding single bibliographic record displays. Individual lines of text in single record displays of the four systems with which users noted favorable experiences were prefaced by alphabetical and/or numeric labels. The use of such labels may set off lines of text to indicate to searchers differences in meaning from one labeled line of text to another.

b. Circulation and bibliographic record displays were the chief locations of abbreviations, codes, undefined messages, jargon, etc. Focus group participants noted difficulty understanding record displays with such information. Displays and command names should be reviewed by library staff and potential OPAC users, or be coded in such a way that would easily accommodate changes after the introduction of the OPAC to the library.

c. Recommendations for the placement of call numbers in bibliographic record displays are: (1) placement along the outer edge of text; (2) far from the neighborhood of other numbers and characters that could be confused with call numbers; (3) labeling call numbers with a label understandable to patrons; and (4) explanations for and examples of circulation and bibliographic record displays in offline and online user aids.

d. Iowa City Public's OPAC users favorably cited the memorability of the order of entering commands or the memorability of a particular command in the course of the search. The OPAC's horizontal array of touch commands might have helped patrons to remember the correct sequence of commands or the correct command. Yet, Iowa City patrons mentioned the need for more directive means of informing them of the next and best step in the ongoing search.

- Online and Offline User Assistance

a. Syracuse University and Iowa City Public OPAC survey respondents cited their system's online user assistance. The Syracuse OPAC's directive prompts following the report of the number of retrievals helped searchers in the display of citations. Help screens were available at all times in the Iowa City Public OPAC, but staff realized that users were embarrassed to be seen using them. The library's experience with changing the initial instructions after finding out patrons' reactions demonstrated

the necessity for allowing individual libraries to alter screen displays, help messages, command names, field names, etc., after implementation of the computer catalog.

b. OPAC users were very favorable toward librarian assistance. OCLC users and OPAC users at Ohio State noted the helpfulness of brochures about OPAC use, and Ohio State users noted that brochures were always available. Ohio State was the only library surveyed where there were always free terminals available.

3. Users' Unfavorable Experiences with OPAC Features

- Subject access

a. Analysis of focus group remarks and questionnaire responses showed that OPAC users experienced difficulty when performing subject searches. Reasons underlying this difficulty were: (1) patrons' inability to match their input term(s) with the OPAC's controlled vocabulary; (2) the burden on the OPAC user of conjuring up broader or narrower terms; and (3) problems consulting the printed volumes of LCSH during the online search.

b. The following six online user aids were discussed and examples provided that were intended to help patrons select searching vocabulary, browse the OPAC, and make satisfactory relevance assessments about displayed items:

1. Alphabetical displays of subject headings. Focus group participants pointed out that this feature has been present in searching the traditional library catalog.

2. Keyword in context subject heading displays. Such displays would help searchers match their entry vocabulary with the catalog's controlled vocabulary regardless of the position of the matched term(s) in a precoordinated (or bound) subject heading.

3. Online displays of related subject headings. Displays of related subject headings were the top-ranked additional OPAC feature in the survey.

4. Augmented subject access to bibliographic records. Augmented subject access to records was ranked second in the list of additional OPAC features. Of Atherton's four benefits derived from a study of augmenting bibliographic records "the ability to answer some queries impossible using today's catalog information" was what focus group participants had in mind when they requested subject augmentation to bibliographic records.

5. Automatic linking of input free text terms to the OPAC's controlled vocabulary. This is already operational in the CITE and PaperChase OPACs and helps searchers to improve the recall of subject searches.

6. Inclusion of subject headings in bibliographic record displays. This would be the alternative to mechanizing the procedure in point 5 above.

- Call Number or Shelflist Searching

a. OPAC users had unfavorable experiences with the call number or shelflist displays in the Iowa City Public OPAC. Since such displays were probably used to find out if library materials were available in the library, the call number search could be simplified to reduce the number of steps (or touch commands) that are necessary to check library materials' circulation status.

b. Ohio State users reported favorable experiences with shelflist searches and displays. Since bibliographic records entered into the Ohio State OPAC prior to June 1978 lacked subject headings, searchers used the shelf position search to improve the recall of OPAC subject searches by using the results of a subject heading search to identify a fruitful call number area. The shelf position search also allowed searchers to "browse the stacks" by perusing titles of books in the area of the input call number.

c. Focus group interview participants at all six libraries recognized the usefulness of browsing books in the neighborhood of a relevant book. Three suggestions are given to take advantage of the classifed arrangement of books:

1. Automatic feedback routine that uses class number areas of relevant retrievals to find additional items. This routine has already been implemented in CITE, a prototype OPAC at the National Library of Medicine.

2. Online Subject Guide. This reports books' class number areas, as well as the number of books found in each class number area under the subject heading of interest.

3. Display of classification captions enumerated in classification schedules to help searchers find books on specific, coordinate, or general topics. The need to browse subjects in context was also expressed by survey respondents when they ranked "list of related words" first among additional OPAC features.

- Reducing or Increasing Search Output

  a. Questionnaire results concerning unfavorable features pointed out OPAC users' problems with reducing or increasing search output. Analysis of transaction logs and focus group interviews showed that reducing or increasing search output is a widespread and prevalent problem.

  b. The following recommendations are made to help searchers reduce the number of retrievals in highly posted known-item searches:

     1. Suggestive or directive prompts to inform searchers to try the search using the author/title approach. As reported earlier in this report, searchers championed the author/title approach as a means of pinpointing the needed item.

     2. Suggestive or directive prompts to inform searchers to limit results by various criteria. Analysis of transaction data showed that few searchers used limit commands, which suggests that they need to be prompted to use them.

  c. The following are recommendations regarding assistance to OPAC searchers whose known-item searches result in no retrievals:

     1. If the author or title approach results in no retrievals, the system produces suggestive or directive prompts informing the user to retry the search using a title or author approach, respectively.

     2. When an author/title search results in no retrievals, the system suggests or directs the user to enter only title or only author information.

     3. Author/title keyword searches. The Syracuse OPAC already allows author/title keyword searches. Searchers need to be prompted when to enter them.

     4. Automatic truncation of title word(s) and/or author names. CITE, a prototype OPAC of the National Library of Medicine, performs automatic stemming routines on users' input words and names.

     5. Spelling correction routines. Spelling correction routines have been implemented in CITE at the National Library of Medicine and BACS at the University of Washington School of Medicine.

     6. Name authority control capability. The University of California's system is an example of an OPAC with name authority control.

d. Recommendations were given to help searchers reduce the output of highly posted subject searches:

1. Suggestive prompts informing users that results can be reduced by the entry of Boolean operators and additional searchable information, limit criteria, or subject subdivisions, etc.

2. Display of related word lists to help users find more specific or additional Boolean operators. The relatively infrequent use of advanced features such as Boolean operators indicates the need for prompts.

3. Online Subject Guide consisting of displays enumerating the class number areas of books, as well as the number of books found in each class number area under the subject heading of interest. Searchers, especially bookshelf browsers, would be directed to the areas of the bookshelves where the majority of books under that topic are located.

e. Recommendations for assisting OPAC users whose subject searches result in no retrievals are:

1. Cross-references online.

2. Related word lists to lead users to more general term(s).

3. Automatic truncation of users' input subject term(s).

4. Augmented subject access to bibliographic records.

5. Automatic linking of input free text terms to the OPAC's controlled vocabulary.

- Output Control Features

a. Difficulties with output control features occurred primarily in connection with entering commands. Traditional library catalog searching required a combination of mental exercise and physical skills. In OPAC searching, physical skills are "logicalized" into a series of command names or touches. OPAC searchers must always keep in mind: (1) the correct command name; (2) correct command entry procedures; (3) correct information about the display, e.g., field labels, next record number to be displayed; and (4) appropriate times to enter commands.

b. Comments in focus group interviews about command names, entry procedures, and the logical sequence of commands in online searches resulted in the following factors that must be considered in the design of output control features:

1. Mnemonic command names or abbreviations.

2. Command names or abbreviations that are easily understandable in view of the operation they perform.

3. Command entry procedures that are easy to remember.

4. Command entry procedures that are consistent from one command to the next.

5. Suggestive or directive prompts that inform users of or guide them through possible actions.

c. Problems with response time were usually specific to individual systems. Focus group interview participants were not particularly bothered by slow response times; when they anticipated slow response times, they sought ways to beat them.

d. The following output control features and the guidelines for them were drawn from an analysis and understanding of focus group participants' problems with specific OPACs' features:

1. Display forward (of single or multiple bibliographic records).

2. Display backward (of single or multiple bibliographic records).

3. Report of the number of retrieved citations or screens of titles resulting from the input of an access point.

4. Report of the number of screens required to display a full bibliographic record and/or circulation information in the first screen of the record, which:

   a. Includes a very visible and understandable directive prompt at the end of the display to guide users to successive screens of the record, or

   b. In the case of multiple (i.e., 5 or more) screens for a displayed record, includes an informative and understandable directory to the contents of multiple screens.

5. Use of messages regarding circulation status that the library can live up to.

6. Display of output ordered by a characteristic that is easily and quickly understood by users.

7. Inclusion of subject headings in brief or intermediate level displays of citations retrieved in subject searches.

- Operational and Search Formulation Control Features

  a. Users' difficulty interrupting the display of information and response time associated with displaying the next bibliographic record from a screen of records resulted in the description of a "report" key that would allow users to obtain a report of the system's progress thus far.

  b. Users' unfavorable experiences with truncation led to the two following recommendations:

     1. Automatic truncation of users' input access points when few or no records are retrieved.

     2. Natural language input of access points and system construction of derived search keys.

- Offline User Assistance

  a. At all five libraries surveyed, users reported difficulty knowing what was included in the OPAC. Following are recommendations for informing patrons about the coverage and contents of the OPAC:

     1. Workshops, group or individualized instruction, and training materials used in workshops or instruction sessions must include a discussion of the coverage and contents of the library's OPAC.

     2. Permanent printed guides or brochures about OPAC use to which searchers can refer when performing online searches at the OPAC, laminated and/or pasted to the terminal or terminal table, posted on walls, etc.

     3. Free printed guides or brochures about OPAC use that are available for the taking.

     4. Permanent signs posted near the library's traditional catalog must refer patrons to the OPAC to ensure that the results of their searches are up-to-date and comprehensive. A sign could say, "Check the computer catalog for books, government documents, magazines, and newspapers published after 1968."

     5. Online message at the end of OPAC search could inform users that there are other resources to check; for example, an online message might say, "Check the card catalog for books, government documents, magazines, and newspapers published before 1968."

b. Excessive queuing at computer catalog terminals resulted in comments from focus group participants about the privacy of their online searches. The formation of a single queue where users stand to wait for the next available terminal is recommended to segregate patrons actually performing online searches from those waiting to perform them.

c. Focus group interviews revealed sets of patrons who refused to obtain a librarian's assistance; wanted to teach themselves how to use devices on their own time and at their own convenience; or felt embarrassed or self-conscious about referring to a brochure or manual during their online search when other library patrons were around. Such patrons would benefit from available pamphlets, brochures, or instruction sheets that they could take with them and study at their own convenience. The implementation of a number of methods of teaching patrons how to use the OPAC is very important to accommodate the variety of personal learning styles and preferences of library patrons.

d. OPAC users at four of the five libraries in the survey were eager for more computer catalog terminals in the library, in locations other than the library, and in library locations other than near the traditional catalog. Focus group interview participants were very keen on obtaining access to OPACs at home, in university offices, campus buildings, and elsewhere.

- OPAC Workstation Design Considerations

a. OPAC users expressed problems with different types of terminals requiring different entry procedures.

b. OPAC users' unfavorable experiences with the amount of writing space and the height of terminals suggest that libraries should consider increasing writing space and providing chairs for OPAC searchers.

c. Interview participants who were most concerned about comfort at computer catalog workstations were technical services and processing staff whose jobs required many continuous hours at a terminal.

d. Few of the libraries at which surveys or interviews were completed made hardcopy printers or printed output available. Survey respondents ranked printers high in a list of the top-ranked additional OPAC features, and focus group participants were very interested in obtaining hardcopy printouts of retrieved citations.

e. Other services and features expressed in a number of group interviews were:

1. Same-day service for hardcopy printouts.

2. Placement of an automatic hold on retrieved materials in circulation.

3. Automatic delivery of library materials to patron's home or office.

4. Designation of the location where a retrieved item is shelved.

- Enriching the OPAC's Database

a. Journal titles were ranked first by surveyed patrons at academic and public libraries among library materials that should be added to the OPAC. Interview remarks demonstrated that users were referring to titles of journal articles in individual issues. Thus, patrons were interested in the addition to the OPAC of the contents of periodical indexes such as Reader's Guide to Periodical Literature, General Literature Index, and of specific subject-oriented periodical indexes, e.g., social sciences, humanities, etc.

b. Newspaper articles, subject bibliographies, and other library reference works were mentioned by survey respondents and/or interview participants as materials they would like added to the OPAC. Patrons' interest in the addition of important reference literature to the OPAC's database suggests the implementation of the following two OPAC features which employ the data already available in the MARC record to direct OPAC users to reference literature:

1. Mischo's (1980) rotation algorithm applied to the subject-rich fields of reference books' MARC records.

2. Analysis of the 510 fields of CONSER records (which state what periodical indexes cover the journal) through the use of an algorithm similar to one used by the PaperChase OPAC to direct users to pertinent periodical indexes, especially in highly posted OPAC searches.

c. Focus group interview participants suggested the addition of campus or community information to the OPAC.

G. User Assistance for Searching Online Public Access Catalogs

1. Online and Offline User Assistance Provided by Participating Libraries

- The types of online and offline assistance provided to OPAC users at the nine surveyed libraries and six libraries where focus group

interviews were conducted demonstrated the variety and amount of assistance available. All libraries offered the assistance of reference librarians who were stationed near the OPAC terminals. Only the Library of Congress offered a center for OPAC terminals where the principal task of reference librarians was to answer inquiries about OPAC use. At other libraries, reference librarians handled both reference and OPAC-use inquiries. Nearly all libraries featured printed materials on OPAC use, which were available for reference at the terminal or for the taking.

2. Non-users (and Why They Will Not Be Non-users for Very Long)

- Over 75% of surveyed non-users were likely to use the computer catalog in the future. Library patrons who would not use the computer catalog in the future had selected "card catalog easier" or "dislike computers in general" as the reasons why they had not yet used the online public access catalog. In general, the main reasons why surveyed non-users have not yet used the OPAC are that they have not taken training sessions on use, they have not had time to learn, or they had no need to use a library catalog.

- The majority of surveyed non-users felt that it would take less than 30 minutes to learn to use the OPAC. More non-users at the five libraries where OCLC was the system under study than at libraries where local online access was studied (Syracuse, Ohio State, Dallas Public, Iowa City Public) thought that it would take more than 30 minutes to learn how to use OCLC. The difference between the two groups might be attributed to the perceived complexity of the OCLC terminal with its many buttons, the paucity of patrons actually seen using the OCLC terminal, or the location of terminals in reference departments.

- A large percentage of non-users who felt that the OPAC would be difficult to learn also felt that it would take longer than one hour to learn.

- Many current non-users of OPACs will eventually become users regardless of the changes in libraries' methods of assisting patrons. Libraries might have to change their methods of assisting patrons to win over non-users who feel that the card catalog is easier to use than the OPAC and who dislike computers in general, such as providing an increased amount of individualized instruction, e.g., introduction of a computer catalog center similar to the one at the Library of Congress, volunteer trainers, or fostering peer teaching for reluctant and self-conscious faculty.

3. Online and Offline User Assistance

- The majority of OPAC users at all surveyed libraries first heard about the OPAC by seeing a terminal in the library. A large number of OCLC users first heard about the OPAC from the library staff.

- OCLC users and OPAC users at Dallas Public learned how to use the OPAC from library staff. In contrast, users at Syracuse and Ohio State relied primarily on printed material to learn to use the OPAC. Iowa City Public's OPAC had been cited by OPAC users for its online assistance in a discussion of OPAC features with which users had had favorable experiences. Users of Iowa City Public's OPAC learned how to use the system by consulting instructions on the terminal screen or in printed materials.

- The source of assistance employed by OCLC users and Dallas Public users in their most recent search was the library staff. Syracuse and Ohio State OPAC users consulted printed material or signs. Iowa City Public's users either did not seek help, or they followed the instructions on the terminal screen to complete their most recent search of the OPAC. The experiences of Iowa City Public patrons contrasted with that of patrons at other libraries because the former relied on the available online assistance to perform their searches.

- Comparisons of the assistance used by very frequent users of the Iowa City Public OPAC with that used by very infrequent or first-time users showed similar patterns in the sources of assistance employed. In contrast, many first-time users and infrequent users of the Syracuse, Ohio State, Dallas Public, and OCLC systems obtained the assistance of the library staff. The findings at Iowa City Public suggested that OPAC searchers would use online assistance when it was provided; this might also reduce searchers' dependence on the library staff, especially those searchers who rarely used the OPAC or used it for the first time.

4. Recommendations for Brochures, Information Sheets, and Other Printed Materials

- Enhancements to OPACs regarding offline or online user assistance were gleaned primarily from focus group interviews. Surveyed users at Dallas Public and Ohio State called for printed materials to assist them at the computer catalog terminal. Since the latter already provided printed brochures for the taking, survey respondents probably wanted a command chart mounted on the terminal near the screen, similar to the charts on terminals at Mankato State.

- An understanding of focus group interview participants' remarks about printed materials available in their libraries led to the following guidelines about the production of printed materials:

1. Prepare printed materials of varying lengths.

2. Include meanings for abbreviations used in OPAC records.

3. Show examples of the major search approaches, i.e., author, title, author/title, subject, call number.

4. Identify field labels and field information in examples of bibliographic record displays.

5. Avoid small print, footnotes, jargon.

6. Highlight the basics of subject searching.

7. Enumerate the coverage and contents of the database and tell users when they should also consult the library's other catalog(s).

8. Pretest printed material.

5. Assistance from Library Staff

- The experiences of library staff listed below describe the range of services they provided to OPAC users who obtained their assistance:

  1. On-the-spot individual instruction.

  2. Answering reference inquiries.

  3. Getting the patron started.

  4. Trouble-shooting.

  5. Group instruction.

  6. Performing online searches for patrons.

  7. Individualized instruction by appointment.

  8. Preparation of offline user aids.

- Library patrons expressed the value of consulting the library staff about OPAC-use problems. Experiences with volunteer trainers at terminals at Dallas Public and Iowa City Public differed. Libraries considering volunteer trainers should provide workshops on at least a monthly basis to help trainers exercise their OPAC searching skills, inform them of new developments in the library's services, and teach them new OPAC enhancements or search strategies. Also, volunteers could debrief library staff about patrons' problems, which could help in the enhancement of the system or the planning of new services.

- Patrons at libraries where there were no formal OPAC workshops or classes expressed interest in attending formal training sessions. The major reason non-users had not yet used the OPAC was that they had not yet attended training sessions on OPAC use. Thus, training sessions would probably be attended by these library patrons.

6. Online User Assistance

   - The importance of online user assistance was emphasized in the comparison of user assistance sought by frequent users and by infrequent or first-time users. The availability of online user assistance might reduce dependence on the library staff by first-time or very infrequent library users.

   - The following suggestions on how to improve online assistance capabilities of OPACs were elicited from focus group interview participants:

     1. Computer-assisted instruction programs.

     2. Dialog modes for patrons based on their experience or frequency of OPAC use.

     3. Informative error messages that explain the nature of the error and how to enter the information correctly.

     4. Prompts that direct the patron to the next logical step in the ongoing search and/or suggest possible actions to take.

     5. User-oriented interface that is like a helpful companion working together with patrons to find library materials rather than working against them.

7. Relearnability of the online public access catalog

   Relearnability of the online public access catalog was a theme that emerged in focus group interviews with library patrons and staff and is supported by statistics on the frequency of library visits, OPAC use, and use of computer systems other than the computer catalog. Online user assistance such as computer-assisted instruction, directive and suggestive prompts, and multiple-dialog modes might be the most successful means of making sure that online public access catalogs would be easy and painless for library patrons and staff to relearn. Research with the concept of supplantation and online retrieval systems is another promising approach to solving the problem of relearnability. Improving the relearnability of existing OPACs and ensuring it in future OPACs is a key issue in the development of online public access catalogs.

APPENDIX I

SUMMARY OF VOLUME 3 OF THE OCLC REPORT

(Sections 3 and 4, with minor editing, from: Kaske, Neal K.; Sanders, Nancy P. A COMPREHENSIVE STUDY OF ONLINE PUBLIC ACCESS CATALOGS: AN OVERVIEW AND APPLICATION OF FINDINGS. Volume 3, final report to the Council on Library Resources. OCLC Office of Research. Report number OCLC/OPR/RR-83/4. Dublin, Ohio 43017. March 31, 1983. 56 pp. plus appendices. Has been submitted to ERIC.)

3.0 APPLICATION OF FINDINGS

The extensive findings from the study are summarized below. Two methods of presentation have been selected: (1) brief, one-sentence statements generalize findings from the questionnaire, interviews, and transaction logs; and (2) specific findings are summarized in question and answer format.

3.1 Brief Generalizations from Findings

These generalizations are offered as a much simplified view of the results of the study; as such, they do not reflect the variation found among the 29 library systems surveyed. Additionally, the reader is advised to observe the following caveats: (1) although the project sample size is large, the return from some of the single library systems was small (less than 100); (2) the questionnaire has yet to be validated with repeated experimentation; and (3) the transaction log and focus group interview data, while generally validating the findings from the questionnaires, is not conclusive, as the data comes from only 4 and 6 of the 29 study institutions, respectively. With these caveats, the following generalizations are offered:

1. In all types of libraries, patrons are conducting more subject searches than most librarians generally believe they do. (And more than most previous studies have shown.)

2. "What is in the database?" is a question for which patrons do not have a clear or correct answer.

3. Patrons will use OPACs to browse tables of contents, book summaries, and books' indexes whenever we add them to the database.

4. Patrons like to have the "how to use the system" information on the terminal or right next to it.

5. The lost arts of lap-writing and writing while standing are making comebacks because the terminal work space is not always designed to provide a place to write.

6. Patrons would like to have printouts of their searches - immediately (not the next day), so that they need not write out search results.

7. Many people do not use a catalog frequently enough to remember how to use it, so the system should have an interface specifically for the new and infrequent users as well as for the expert or frequent user.

8. Locate the terminals where people can see them, since if they see them they will use them.

9. Some people feel the lack of privacy when using the OPAC because anyone can see what is retrieved and displayed on the screen.

10. People do not generally consult full bibliographic record displays.

11. Patrons do not like or understand many of the abbreviations used.

12. People browse the online catalog.

13. Patrons believe the online catalog is fast and easy to learn to use even if they have not used it before.

14. A great majority of patrons learn to use the system on their own, some with a little help from a friend or the librarian.

15. Online catalogs are preferred over the card catalogs by OPAC users. (Non-users are as yet undecided.)

16. Patrons want more items in the database, such as circulation status and magazine articles.

17. More terminals are requested and some patrons want to access the OPAC from home.

18. Patron expectations are high and will be even higher in the future when they see what can be done to enhance existing OPACs and when they have had the opportunity to use more than one OPAC or online retrieval system.

3.2 Specific Findings in Question and Answer Format

These questions were obtained from the libraries working with OCLC on this project. The questions have been categorized into logical sets for ease of reading. Where appropriate, the sections in the two major volumes of this report are noted so the reader may locate the complete discussion of the data collected. The answers provided here are therefore brief by design and are to

be used with the supplemental information cited. (Editor's note: The specific references to supplemental material in volumes 1 and 2 are sometimes lengthy, and have been deleted from this reprinting of section 3; an asterisk (*) has been used to indicate where such material has been removed.)

CATEGORY A QUESTIONS RELATED TO THE EVALUATION AND/OR DESIGN OF OPACS

Question 1. What are the differences between catalog users at different types of libraries that might influence the criteria for design and evaluation of OPACs for each type of library?

Answer There are no characteristics that differentiated catalog users at one type of library from those at another. However, with each type of library, differences did exist between frequent and less frequent OPAC users. Statistics showed that "...OPAC use was not an everyday task of library patrons at any of the 5 types of libraries surveyed."* Therefore, "relearnability" or the ease of relearning the use of the system was shown to be a key element of design and evaluation in OPACs for all types of libraries. Additionally, patterns have been noted in the transaction log analysis. However, no connection between given users and the pattern has been established.

Question 2. Is it preferable to build in a separate authority or cross-reference file in an online catalog, or to make cross-referencing or linking transparent to users?

Answer Patrons prefer the cross-reference structure to be visible, though not intrusive. The switch from the term entered to the controlled term should not be transparent, but prefaced with a brief explanation. For example, the screen could read "'World War 2' = 'World War, 1939-1945' in this catalog".*

Question 3. How is catalog use expected to change over time in an online catalog environment? For example, will major emphasis be on known item searching, or on subject/keyword access? If the latter, how best does one approach this form of access, given the restriction of a controlled subject vocabulary designed for a card catalog?

Can we bypass conventional subject access, using subject heading words in a free text environment, or should we stick to a strict use of subject access in the traditional sense?

Answer All the data points to a high use of subject access. Term word searching or searching by subject headings alone will not be sufficient. Subject headings are needed for the collocative functions, and term searching is needed when the patron only has one term in mind. However, the uncontrolled and controlled terms should be linked.*

Question 4. If our computer indexes are bound by data available to us, i.e., LC subject headings, should we contemplate loading thesauri of commonly used terms or term combinations?

Answer There is a real need for a link between the controlled vocabularies and common terms, although the work will be costly. (Linkage through classification numbers would also prove helpful.) Without appropriate links, patrons will likely try one or two combinations and, assuming the library has nothing to satisfy their needs, discontinue the search. Currently research in this area is being conducted by Robert Niehoff of Battelle.

Question 5. Should the online catalog simply replace the card catalog or should the circulation function be a part of it? What are the cost to benefit considerations?

Answer Yes, the circulation function should be added. The patron will save time and probably expects that the circulation information is there anyway. This project did not address the cost or cost/benefit questions.*

Question 6. At what point, in an attempt to respond to the more sophisticated needs of some catalog users, do we so complicate the system that it is virtually unusable by the vast majority of users? Should there be two or more versions? If so, what about cost factors?

Answer Patrons want and will use two or more levels of a system. There are currently at least two groups of users (first timers/ infrequent users and heavy daily/expert users). We may want to have three levels, one for the first timers/infrequent users, one for the once every two weeks or so user, and one for the daily expert user. The move from one level to the next should not be noted by the patrons; they should just learn more each time they use the system. It is suggested that libraries offer a variety of approaches to online and offline user assistance to accommodate the variety of personal learning styles and preferences of OPAC users.*

Question 7. What are the essential characteristics of the successful online catalog?

Answer We do not know the answer to this question yet. We are only beginning to learn some of the OPAC charactistics found desirable by library users; we do not yet know which are essential.

Question 8. Is there a common, essential set of characteristics of the libraries where online catalogs are successful?

Answer — Some of the characteristics of the different libraries were noted, but not at the level needed to answer this question. The term "successful" is one that needs to be defined with great care; it is so often a value judgment.

Question 9. — Which online catalog has the most successful prompts? What are the characteristics that make them successful?

Answer — The Iowa City Public Library patrons give high marks to the prompts in their system. The characteristics of successful prompts are outlined in volume II of this report.*

Question 10. — What are the characteristics of a successful command package? (Cursor location, punctuation, spacing, etc.)

Answer — This question cannot be answered fully as long as the term "successful" remains undefined. Some of the factors to consider in the design of output control feature are: (1) mnemonic command names or abbreviations; (2) common names or abbreviations that are easily understandable in view of the operation they perform; (3) common entry procedures that are easy to remember; (4) command entry procedures that are consistent from one command to the next; and (5) suggestive or directive prompts that inform the user, guide the user through possible actions, and explain how to carry out the actions.*

Question 11. — Does the online catalog display cause problems? Which of the online catalogs have the most successful (preferred) displays?

Answer — Yes, online catalog displays cause problems. It is not possible to say which OPAC is the most successful or preferred in this area. But a good deal on output controls is reported in volume II of this report.*

Question 12. — Does the inclusion in the catalog of information intended only for library staff cause problems for library patrons?

Answer — Yes. A graphic answer to this question is shown in volume II of this report, where a record for Arthur Haley's Roots is given for four different systems, and related quotes from focus group interviews are cited.*

Question 13. — Does online catalog research have findings similar to those of earlier card catalog research on such topics as, for example, the proportion of subject to known item (author/title) searches?

Answer — No. The findings from earlier card catalog studies are not similar to the findings from online catalog study; there is a greater proportion of subject searching in online catalogs.*

Question 14. What "human factors" in the OPAC environment (terminals, furniture, work space, location, access, setting) influenced OPAC use and patron satisfaction?

Answer Patrons are very much aware of the lack of good "human factors" design relative to the OPAC. For example, there is little space to write or store belongings while using the catalog. Many of the systems respond in only a few seconds, then the patron often needs 15 minutes to write out the information. The result is long queues.*

CATEGORY B QUESTIONS RELATED TO USER EDUCATION/TRAINING AND PROMOTION OF OPACs

Question 1. What techniques were found to be most successful in promoting the OPAC in the libraries studied? Were they different for different categories/levels of users?

Answer This study did not track over time the promotion of the different systems to their different patron groups. However, user assistance is discussed elsewhere in the report.*

Question 2. What are the best training methods for users?

Answer We did not single out any training method. "The analysis of focus group interviews and questionnaires provided no evidence that there were right or wrong approaches to user assistance or that one approach was overwhelmingly acceptable or sufficient for assisting most OPAC users." This statement, and additional information, may be found elsewhere in this report.*

Question 3. Were planned programs of patron education judged to be effective in the libraries studied?

Answer In libraries where these planned programs were given, the patrons liked them. In libraries where they were not provided, patrons asked for them.

Question 4. What printed aids were found to be most helpful? Could printed aids be used to entice a non-user to become an OPAC user?

Answer The printed aids that were helpful were short and to the point. As for enticing the non-user, we must first look at why people are non-users. The five top reasons given for why non-users have not used OPACs yet, according to the questionnaire data, are the following: 1) I have not yet taken training sessions on use; 2) I have not had time to use it; 3) I have not needed to use any library catalog; 4) I did not know there was a computer catalog; and 5) visitor or infrequent library user status.*

Question 5. What types of staff assistance were found to be most effective? One-on-one training? Classes? Were different types of assistance perceived more helpful (or less intrusive) by different categories of patrons?

Answer Since there are so many learning styles, it is essential to provide all types of help. This question is much like questions 1 and 2 above.*

Question 6. What are the demographics of users who are more receptive to the online catalog? Who are more resistant?

Answer The most receptive are young students and researchers who require comprehensive information. The most resistant are older people who have good personal libraries.*

Question 7. What differences were discovered among the users of the OPAC by subject area or department (as judged by departmental library used)?

Answer Being the first of its kind, the research design for this study required aggregation of data at a broader level. If the data collected were divided by departmental library (which it should not be), the sample size would not be sufficient to support the analysis.

CATEGORY C QUESTIONS RELATED TO PATRON USE AND ACCEPTANCE OF OPACS

Question 1. What are the characteristics of the successful versus the unsuccessful OPAC user? Of the user versus the non-user? Of the satisfied versus the unsatisfied or dissatisfied OPAC user? How does the user judge the success of a search?

Answer This question cannot be answered since we have not defined successful or unsuccessful searching. We did find, however, that patrons do not always separate the success or lack of success of the search from the finding of needed information. When a patron speaks of success in the context of library use, he or she refers to satisfying an informational need, not just using a catalog correctly.

Question 2. Are there patterns in the success and/or failure of searches in the online catalog? What are the patterns? Do they differ among types of OPACs? How?

Answer With regard to search patterns, the transaction logs for a few systems show that patterns do exist. These patterns are noted for both the user who stays on the system for a time and for those who just seem to make errors.*

Question 3. Can we meet the users' expectations for the new catalogs?

Answer Patrons expect a great deal, and although they are willing to give libraries some time, they may well find other information providers if we fail to meet their expectations.*

Question 4. What are the similarities and differences between use of the online catalog and the card catalog?

Answer The data collected for this study has not been studied from this point of view yet. The questionnaires asked people to recall only their last search and did not seek comparisons.

Question 5. What is the user's next step when unsuccessful at the online catalog?

Answer This question was not formally addressed by this study. However, from the transaction log data analysis we know that when a person makes an error using an OPAC, there is a 50% chance that his or her next action will also be an error.*

Question 6. Who does the patron blame for an online catalog failure?

Answer Patrons blame both the system and themselves for not getting the OPAC to work. Frustration can be read from the transaction logs, because there are sometimes four-letter messages to the library and the system when someone cannot get the OPAC to function. We also heard patrons in the focus group interviews say that they know the library had a given book but they could not get it to come up on the system.

Question 7. What are the significant differences among libraries in the acceptance of online catalogs both by library staff and by users?

Answer This topic was not studied.

Question 8. What library support is necessary to facilitate successful patron use of the online catalog?

Answer The key is a diversity of approaches.*

Question 9. Were users generally found to have conceptualized their search well (effectively and efficiently) in system terms? Were any of the systems particularly helpful in assisting the user to formalize a search request?

Answer This research effort did not attempt to answer this question, but the Subject Access study just completed by Dr. Markey of OCLC did address this issue. Her report, "The Process of Subject Searching in the Library Catalog: Final Report of the

Subject Access Research Project," is report number OCLC/OPR/RR-83/1 in the OCLC Office of Research Report series. This and other research reports are available from ERIC and OCLC.

Question 10. Did the users generally seem aware of system capabilities and coverage?

Answer Patrons have yet to learn and use all the OPAC capabilities. The command usage data collected in the transaction log analysis document this. Additionally, few patrons understand the content of the OPAC.*

Question 11. What elements of the record does the user feel are important?

Answer This topic was not studied in this research effort. Other studies report that patrons do not understand the different parts of a bibliographic record.

Question 12. Do they understand the concept of subject headings and how they affect searching? Subject and name control? Thesauri?

Answer Some do and some do not understand subject heading, name control, and thesauri. The research suggests that we should not require this knowledge of patrons, but should build systems which supply it.*

Question 13. Were users able to locate corporate authors or government publications more easily in the OPAC than in the card catalog?

Answer This was not addressed in the study.

Question 14. Was online assistance available to the user in any of the systems--and was it used/perceived to be useful?

Answer Yes, online assistance was available and was used by the patrons.*

Question 15. At what point in a search would assistance be most useful?

Answer We do not have a complete answer to this question, but we do know that patrons want and need assistance when they have not found items they need or when they have located too many items.*

Question 16. What are user expectations for response time? Is response time ever too fast?

Answer This topic was not addressed specifically by this study, but other research efforts report that people do not want to wait much more than 8 to 12 seconds. For those who use systems often, response time is seldom too fast. During the focus group interviews in this research, it was noted that response time can

be too fast if the patron does not know that the screen has changed. This occurs when the response to the current query is the same or almost the same as the last query and the patron does not notice the screen flicker.

Question 17. How can downtime be made minimally inconvenient to the user?

Answer This question was not specifically addressed, although comments suggested that preserving search results on the screen when the system goes down would be particularly helpful.

Question 18. Can the user distinguish downtime from slow response? If not, what can be done about it?

Answer This was not studied. However, we have noted people "terminal hopping" when a system goes down; that is, moving from one terminal to another looking for one that works. It may be best to post in some central spot that the system is down.

Question 19. Can the impact of the OPAC really be judged when an alternative catalog exists?

Answer This was not studied but people have been willing to wait in line for a terminal even if the card catalog is in the next room. When users were asked to compare the OPAC to other catalogs, most said the OPAC was better.*

CATEGORY D QUESTIONS RELATED TO THE IMPACT OF THE OPAC ON OTHER LIBRARY OPERATIONS AND SERVICES

Question 1. What is the impact of the online catalog on other aspects of library service? For example, on the demand for reshelving, searches, holds, reorders, etc.

Answer There is and there will continue to be an impact on other library services. For example, if circulation data is reported on the OPAC, patrons will expect the book to be on the shelf if they note that it is available. We will need to shelve returned books very soon after their status has been changed from circulating to available.*

CATEGORY E QUESTIONS RELATED TO THE LARGER ISSUES: HOW WILL THE OPAC AFFECT THE FUTURE OF LIBRARIES AS INSTITUTIONS/ORGANIZATIONS

Question 1. What are the implications for major changes in library service and perceptions of what the library is, as its catalog becomes widely available through terminals outside the physical library?

Answer — People will expect more from their libraries. They now want more and better subject access. The personal computer revolution will soon have its effects on the OPAC, since in some cases patrons now use the OPAC from their homes and offices. One need only spend a few minutes with these reports to see that OPACs are changing our libraries.

CATEGORY F QUESTIONS RELATING TO COST AND FINANCING OF OPACS

Question 1. How will we control the costs for the use of the system and who should pay? (It is generally believed the OPAC use should be free to patrons, though the cost of that service is generally higher than that of maintaining the card catalog and related services. Should patrons be asked to "cost-share" for the new service?)

Answer — This question was not addressed by this study. It is a major question and it should be addressed soon.

Question 2. How many terminals will we need to have? What operations can be cut back in other areas of the library and the attendant cost-savings used to finance the OPAC?

Answer — It is possible to determine the required number of terminals if the arrival times and service volume during a time period are known. The pattern of use (distribution) must be known too. Such patterns have been determined in previous studies (e.g., Terminal Requirements for Online Catalogs in Libraries - National Science Foundation sponsored - OCLC). The average service times for five OSU libraries ranged from just under 4 to just over 9 minutes. For Syracuse, the median service time was 3.55 minutes. For Dallas, the median was near 3 minutes. Dallas' system data was recorded to the nearest minute.*

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4 AREAS OF ADDITIONAL RESEARCH

This study marks only the beginning of the research that must be done to provide library patrons with the best online catalogs possible. The tools we have used, survey questionnaires, focus group interviews and transaction log analysis, must be used again and again over the next few years at the same and at different libraries in order to amass the knowledge needed to provide an acceptable human-computer interface. The need for this additional research is clear from all of the questions noted in section 3 of this volume. It is vital that we continue this research, share the results, and study what others in fields related to human-computer interaction are learning.

In particular, future research should follow the attitudinal changes of patrons about OPACs. We have learned that the attitudes of patrons who use computers other than the library's computer catalog are not much different from those of patrons who do not use computers other than the library's OPAC. We expect changes in attitude between these two groups as personal computers grow in popularity and everyday use. Changes in patrons' attitudes may also occur when they have had an opportunity to use more than one OPAC. Today, with as many as four different OPACs available in the libraries of one city, such a comparative study soon will be possible.

Another rich area for research is the study of transaction logs over time to see the effects of changes in a given system. For example, we have learned that some online error messages and online help screens are not particularly helpful and that patrons who make one error are very likely to make another error. When changes are made in OPACs in which transaction log data is available, we will be able to study the effectiveness of these system changes. The opportunity to monitor our modifications in an unobtrusive manner will make it possible to improve the ability of patrons to access information.

APPENDIX J

SUMMARY OF PART 2 OF THE UNIVERSITY OF CALIFORNIA REPORT

(Summary, with minor editing, from: Larson, Ray R. USERS LOOK AT ONLINE CATALOGS: RESULTS OF A NATIONAL SURVEY OF USERS AND NON-USERS OF ONLINE PUBLIC ACCESS CATALOGS. PART 2: INTERACTING WITH ONLINE CATALOGS. Final report to the Council on Library Resources. University of California Systemwide Administration. Division of Library Automation and Library Research and Analysis Group. Berkeley, CA. 94720. April 5, 1983. 54 pp. plus appendices. Has been submitted to ERIC. Editor's note: The summary of the first report from the University of California is reprinted in section III, pages 18-21.)

As one of the five organizations conducting a coordinated study of users and non-users of online catalogs, funded by the Council on Library Resources, the University of California has a dual role. First, it is a participant in the study contributing its share of data and analysis; and second, it is the data processing "utility" for the user and non-user questionnaire data collected by all the participating organizations. It is in the latter role that we submit to the Council this Final Report on an analysis of computer transaction logs contributed by four of the online catalog systems participating in the Public Access Project.

The objectives of the national survey were:

1. To produce data and interpretations that will enable designers of public online catalogs to improve system interface features, including command language, display, search methods, and other matters related to catalog hardware and software.

2. To produce data and interpretations that will enable libraries to improve the implementation and support services (the organization interface) for public online catalogs.

3. To collect additional data that will enable libraries to remove barriers to use of the online catalog and to extend service to potential users.

This report supplements the analyses of User and Non-User Questionnaires by providing analysis of data from the systems themselves.

The four systems contributing data to this analysis were:

- MUMS/SCORPIO, two related systems used at the Library of Congress for public access to library holdings, technical processing support, and access to non-bibliographic files.

- LUIS, the Northwestern University public access system, which was developed from, and shares equipment, software, and data with, systems for technical processing support and circulation control.

- ULISYS (Universal Library Systems), a "turnkey vendor" system that supports circulation control and other library functions, as well as public access to the online catalog; the application studied here is the installation at the West Valley Community College District (Mission and West Valley Colleges) in California.

- MELVYL, the prototype online union catalog of the University of California. MELVYL runs on mainframe computers located at the University's Systemwide Administration, serves all nine UC campuses, and is designed solely to provide public access to the cataloged holdings of the UC libraries.

The contents of the four transaction logs are described in detail, and samples are provided. Analysis includes, for each system, the relative use of system commands and access points, tables of transitions from one command to another, and measures of the complexity of actual searches conducted by users. Use of commands is analyzed both in "raw" form and by generic "type of command."

Although it proved difficult to make valid generalizations from the log data from these four systems, we found that:

1. Most users search by subject. Transaction logs confirm the findings of the CLR questionnaire study: when subject searching capabilities are available, they are used with greater frequency than author and title searching.

2. Search sequences follow command structures. A review of command transitions shows that most users follow logical search progressions dictated by the command structures of the computer catalogs, e.g., they begin a session, conduct a search, display results, conduct another search, etc.

3. Most users conduct simple searches. Where systems provide complex and sophisticated searching features, they are rarely used.

4. About ten percent of user commands are errors. In command-driven systems, over ten percent of user entries appear to be errors. In MELVYL Lookup Mode, the only menu-driven interface included here, error rates are lower than two percent. In command-language systems, the number of errors seems large enough to justify further study and analysis. Error rates can be reduced through system improvement, as shown by a comparison of two different versions of Northwestern's LUIS.

Certainly the most striking aspect of the comparison among systems presented here is the enormous variety represented in these systems: variety in command structures, features, and command languages, as well as variety in

the kinds of transaction data recorded by the systems. Merely interpreting the data from a single log requires a good deal of special information. It is evident that the amount that can be learned from comparing systems is extremely limited. The problems of making valid generalizations from this analysis arise from:

1. Absence of agreement on what variables to include in a transaction log for an online catalog;

2. Absence of standards for defining and measuring those variables; and

3. Lack of a conceptual structure that permits comparison of diverse command structures and design approaches.

There is reason to believe that analysis of transaction logs can have both short- and long-range benefits, but we doubt that sufficient knowledge is presently available to immediately solve the problems of theory and standards discussed above. Additional analytical work with transaction logs should be encouraged, but it should be concentrated in individual systems and involve staff with an intimate knowledge of the systems to be analyzed. Work of this sort would have both immediate benefits for the participating systems, and long-run benefits in creating the foundations for standardization and theoretical development that are necessary for valid generalization from transaction log data.

APPENDIX K

SUMMARY OF THE UNIVERSITY OF CALIFORNIA REPORT ON MELVYL USE

(Summary, with minor editing, from: University of California Systemwide Administration. Division of Library Automation and Library Studies and Research Division. UNIVERSITY OF CALIFORNIA USERS LOOK AT MELVYL: RESULTS OF A SURVEY OF USERS OF THE UNIVERSITY OF CALIFORNIA PROTOTYPE ONLINE UNION CATALOG. Final report to the Council on Library Resources. Berkeley, CA. 94720. March 31, 1983. 101 pp. plus appendices. Has been submitted to ERIC.)

As one of the five organizations conducting a coordinated study of users and non-users of online catalogs, funded by the Council on Library Resources, the University of California has a dual role. First, it is a participant in the study contributing its share of data and analysis; and second, it is the data processing "utility" for the user and non-user questionnaire data collected by all the participating organizations. It is in the former role that we submit to the Council this Final Report on a survey of the users of the University of California Online Union Catalog, MELVYL.

The objectives of the national survey were:

1. To produce data and interpretations that will enable designers of public online catalogs to improve system interface features, including command language, displays, search methods, and other matters related to catalog hardware and software.

2. To produce data and interpretations that will enable libraries to improve the implementation and support services (the organization interface) for public online catalogs.

3. To collect additional data that will enable libraries to remove barriers to use of the online catalog and to extend service to potential users.

This report addresses those objectives as they apply to MELVYL and its implementation in the University of California libraries.

Between March and May of 1982, an online questionnaire was administered to every 25th user who began a MELVYL session. The content of this questionnaire was identical to that developed jointly by the project consortium. MELVYL users completed 1,259 online questionnaires during this period. Questionnaire data were supplemented by information from the MELVYL computer transaction logs, permitting analysis of issues like the relationship between actual computer response times and perceived response-time problems, and between the number of records retrieved and the users' reported satisfaction.

We found that MELVYL users are frequent library users and frequent users of both the online catalog (only 9 percent were first-time users) and the card catalog. Over 80 percent discovered the catalog by seeing a terminal in the library, and over half said they learned to use MELVYL from instructions on the terminal screen. A majority of respondents were men, and over 60 percent were undergraduates. MELVYL users come from all academic disciplines, but relative to users of online catalogs at other participating libraries, more MELVYL users appear to come from scientific disciplines and engineering. The characteristics of the MELVYL user population are apparently strongly influenced by the specific locations of the limited number of MELVYL terminals and the characteristics of the libraries in which those terminals are placed.

Most users come to the catalog with subject-related information, and most conduct subject searches.

MELVYL users report that their most serious problems in using the system include remembering what is included in the catalog, using truncation, reducing large retrieval results, scanning through long displays, interrupting output, increasing inadequate search results, finding the correct subject term, entering commands, selecting from a list of choices, and waiting for the computer to respond. Compared to respondents from other participating libraries, MELVYL users find it easier to conduct searches of all kinds (particularly subject searches), to understand bibliographic displays, instructions and explanations, and to reduce large search results. For the most part, users of Lookup Mode (a menu-driven mode designed for users who are unfamiliar with the catalog and/or do not want to learn the command language) have more serious problems than Command Mode users. Many users complain about inadequate response times, but analysis shows that the users' attitudes are more strongly related to the search mode they use than to the actual system responses they experience.

In assessing problems with library support services, MELVYL users have more than average difficulty finding a free terminal, and two-thirds report that writing space at the terminal is inadequate. Most users claim that they either did not get help while conducting their search, or received help online.

About 31 percent of MELVYL users found nothing that they were looking for in their most recent computer search, and a similar number of respondents found their last search unsatisfactory. This result can be attributed in large part to the fact that the prototype database includes records for only about 7 percent of UC's bound volumes, and includes nothing cataloged after 1980. Nonetheless, almost half the respondents found some things of interest during their search that they were not specifically looking for. Despite a relatively high degree of dissatisfaction with search results, over 90 percent have a favorable attitude toward MELVYL in general, and over two-thirds prefer MELVYL to the card catalog; only 14 percent thought the card catalog was better, and only 7 percent expressed an unfavorable attitude toward MELVYL.

When asked how they would like to see MELVYL improved, a majority of users expressed interest in being able to view a list of words related to their search terms, and in having information about the circulation status of materials. The ability to search a book's table of contents or index, and the ability to print search results are also popular improvements. When asked how the library could improve MELVYL support, users said they wanted more terminals, both within and outside the library. Among improvements to the database, addition of serial titles was most popular, followed by added monographic records, government documents, newspapers, and dissertations. Most classes of material were wanted by at least 20 percent of respondents, and only about 4 percent said they were satisfied with the present database.

In reviewing the findings from this study, we observed first that our interpretations of the data were dominated by the limitations of the database (which affect retrieval results and satisfaction) and the current distribution of terminals (which affects user characteristics and searching patterns). Despite the serious limitations imposed on the analysis by the prototype nature of MELVYL at the time of this study, it is possible to make some general observations.

The first group of observations confirms the results of earlier analysis of a wide variety of online catalogs:

- Most users (over 90 percent) like online catalogs; MELVYL is no exception.
- Most have discovered MELVYL by seeing terminals in the library; the UC libraries have been quite effective in making the prototype system visible and accessible to the public.
- The demand for additional terminals is great, both to reduce waiting time and to provide convenient access to the catalog from locations other than the library.
- Not enough attention has been given to terminal furniture; two-thirds of MELVYL users complain about insufficient writing space.
- There is substantial demand for printing capabilities.
- There is substantial demand for augmenting the database, both through addition of monograph records and inclusion of other forms of material.
- Subject searching predominates in MELVYL as in other online catalogs, and subject searching problems appear to be important. Even though subject access appears easier in MELVYL than in most other systems, attempts to improve users' success in subject searching, both through user training and system improvements, should be a high priority.
- Most users want to get circulation status information from the online catalog.

- Most users do not express a need for detailed bibliographic information. It would be best to provide very brief displays as defaults, and make it easy for users who want additional information to get it through optional displays.

A few additional observations about MELVYL users are not explicitly validated by previous findings, but appear to merit consideration and discussion.

- For most of the online catalogs studied, the majority of users are men, and men are both more successful and more satisfied with the online catalog than women, according to their own reports. In MELVYL, we found that men outnumber women by two to one in the survey sample, and males are more likely to be users of Command Mode than are females.

- MELVYL users claim to be using the online catalog to find "another library that has a book, journal or magazine that I want" at a somewhat higher rate than do users of other online catalog systems. Over 10 percent of respondents gave this answer, suggesting a substantial demand for inter-institutional bibliographic access and intercampus lending services.

- The analysis of MELVYL responses lends additional weight to the belief that menu-driven systems are not necessarily easier to use than systems requiring mastery of a command language. Lookup Mode users generally had more difficulty and were less satisfied than users of Command Mode.

- We discovered that attitudes about computer response time had more to do with the user's search mode than with actual system response, suggesting that users' expectations are at least as important as actual response in determining the "adequacy" of response time. Lookup Mode users, for instance, are quite satisfied with response times twice as long as those experienced in Command Mode. Because improving response time often requires significant financial outlays, it would seem that this area should be a high priority for further study.

- It is evident that when extensive online assistance is provided it will be used; MELVYL users said they used online assistance to learn how to search and to get assistance during a search at about twice the rate reported by users of other systems. We find no grounds for debate about whether online help will be used; the next frontier is to evaluate the teaching effectiveness of online help systems and develop designs for their improvement.